12-15-2016

The Role of Prospective and Retrospective Cognition in Adolescent Mental Health

Gabriel F. Byer-Alcorace
University of Connecticut - Storrs, g.f.byeralcorace@gmail.com

The Role of Prospective and Retrospective Cognition in Adolescent Mental Health

Gabriel Franklin Byer-Alcorace, PhD

University of Connecticut

2016

This study attempted to replicate the methods of Miles, MacLeod, and Pote (2004) who attempted to extend the application of a theory proposed by Andrew MacLeod and colleagues in the late 1990s. Only the aforementioned study has examined this theory with adolescents ages 14 to 19 year olds enrolled in public schools and 18 to 19 year olds enrolled universities. In the present study 169 students were asked to complete an assessment battery containing measures of depression, anxiety, stress, hope, and demographic information, as well as completing a positive and negative cognition task. It was hypothesized that a strong negative relationship would exist between Positive Future cognition (PFC) and depression, that a positive relationship would exist between Negative Past cognition (NPC) and Stress, and a positive relationship would exist between Negative Future cognition (NFC) and Anxiety. Hope was used in contrast to PFC, NPC, and NFC to determine if each had a unique contribution to the variance above and beyond an already established positive cognition construct. The results demonstrated that there was not enough difference between PFC and Hope to establish that PFC has a unique contribution to Depression, however both NPC and NFC did have some unique contribution relative to Hope on Stress and Anxiety respectively. It should also be noted that there were significant limitations to the sample size, sampling procedures, and method of measurement for the cognitive task and that going forward these issues should be considered.

The Role of Prospective and Retrospective Cognition in Adolescent Mental Health

Gabriel Franklin Byer-Alcorace

B.A., University of Connecticut, 2007

M.A., University of Connecticut, 2010

6th-Yr Cert., University of Connecticut, 2014

A Dissertation

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

at the

University of Connecticut

2016

APPROVAL PAGE

Doctor of Philosophy Dissertation

The Role of Prospective and Retrospective Cognition in Adolescent Mental Health

Presented by

Gabriel Franklin Byer-Alcorace, B.A., M.A., 6th Year

Major Advisor _____

Dr. Melissa Bray

Associate Advisor _____

Dr. Thomas Kehle

Associate Advisor _____

Dr. D. Betsy McCoach

Reader _____

Dr. Orville Karan

Reader _____

Dr. Nicholas Gage

University of Connecticut

2016

ACKNOWLEDGMENTS

The initial encouragement to pursue my PhD came from Dr. Melissa Bray during my studies as a school counselor. At that time I had come to a professional crossroads where I could continue on in counseling or I could return and explore school psychology, and I was indisputably torn between the two. Dr. Bray's support ultimately ignited a new professional passion in me, and subsequently this decision was one of the greatest choices I have made to date; it opened my eyes to an experience that has profoundly changed my life for the better.

Additionally Dr. Bray's support as a major advisor over the past several years has been nothing less than exemplary, her dedication to her students coupled with her desire to push students to stretch their professional boundaries has helped to broaden my perspective as a researcher and practitioner, as well as instill a sense of security and faith that in my learning and experience there were individuals who were there to support me and ensure that I would have the opportunity to see my goals and ideas through to the end.

I must also extend similar and heartfelt thanks to Dr. Thomas Kehle who in his frequent intellectual challenges has taught me to be a stronger researcher and critical thinker. Throughout my time in the school psychology program both he and Dr. Bray have been mentors, offering their own unique style of guidance. Additionally, Dr. Betsy McCoach has offered me great insight; her guidance often came in the form of thoughtful advice about keeping my project in perspective and manageable. She has always expressed a sincere investment in my ideas and keeping my study within the bounds of the resources available to me. In the end her guidance, advice, and direction has kept me grounded with a sense of practical realism and scope for my research without stifling my ambition, for which I am incredibly grateful.

I would also like to say thank you to Dr. Orville Karan and Dr. Nicolas Gage who have both offered great insight and support in my experience as a PhD candidate. Dr. Karan, as a retired director of the school counseling program at UConn, has known me the longest out of all of the members of my committee and has undeniably helped to shape my education and professionalism. He was a firm supporter of my decision to shift career directions from counseling to psychology. Without his encouragement and guidance, I may not have made this amazing decision to pursue my dream and achieve this educational milestone. Likewise, Dr. Gage presented himself to me first as a supervisor but eventually as a friend and professional colleague. His insight and constructive critiques of my methods were thoughtful contributions to my research, and indicated to me that he would be an invaluable professional resource and collaborator.

Finally, it would be wrong not to recognize all of the other significant people in my life who made this possible, my parents who have always been dauntless supporters of my education, my brother who has shared the stress and excitement of higher education with me, and the remainder of my family and friends who have both supported me in the good times and endured with me in the not so good times. I thank them all as much as anyone can. I can confidently say that although it may seem that this achievement is my own, it is in fact a shared accolade of all who have seen me through this process from day one to the present.

Additionally, I'd like to dedicate this project to my grandfather Dr. Seymour Byer M.D. who was a relentless and supportive reminder of how important it is that I follow through with my dreams. Unfortunately, he passed away before he could witness the completion of this project, but his guidance was and will always be a critical component of my success.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION AND FRAMEWORK OF THE STUDY

The issue of mental health treatment takes on a particularly unique form within the school setting as the time and resources available for treatment are limited and the scope of what can be accomplished within a given time frame can be a serious concern for some practitioners. Given these limitations it is imperative that school psychologists remain vigilant regarding the latest and most efficacious diagnostic techniques, risk factors, and treatment methods for depression and other prolific mental health concerns in the child and adolescent student population.

Characteristics of Depression in Adolescents

Prevalence

In 2012 a National Survey on Drug Use and Health (NSDUH) indicated that, based on the DSM-IV-TR diagnostic criteria, 2.2 million or 9.1% of all adolescents in the United States experienced a major depressive episode within a 1 year period (U.S. Department of Health and Human Services, 2012). An episode was defined as a period of two or more weeks of depressed mood or loss of interest or pleasure, as well as four other symptoms affecting daily life function, such as abnormal sleep, eating, energy level, focus/concentration, and negative self-image. Although this survey did not exclude cases which were the result of illness, bereavement, or substance abuse, it nevertheless indicates that there is a substantial population of adolescents who need clinical attention for depression.

Symptoms

It is common to experience short periods of sadness or feeling down, but depression defines longer and more severe episodes which disrupt day to day life for the individual or their family and friends. The symptoms of depression can manifest in a variety of pathologies such as

Major Depressive Disorder, Persistent Depressive Disorder, and Bipolar Disorder (American Psychiatric Association, 2013). However, even with their different manifestation patterns there are common signs and symptoms that are present in all forms; persistent sad, anxious or "empty" feelings, feelings of hopelessness or pessimism, feelings of guilt, worthlessness, or helplessness, irritability and/or restlessness, loss of interest in activities or hobbies which were once pleasurable, fatigue and decreased energy, difficulty concentrating, remembering details, and making decisions, insomnia or excessive sleeping, overeating or loss of appetite, thoughts of suicide or suicide attempts, as well as aches and pains including digestive problems that do not ease with treatment (National Institute of Mental Health, 2011).

Differences between Adolescents and Adults

These signs and symptoms of depression may be expressed in adolescents in ways that differ from those of adults due to considerable developmental differences (National Institute of Mental Health, 2011). There is evidence that indicates that untreated depression in adolescents leads to continued depressive symptoms including a high rate of suicide, increased occurrence of psychiatric and medical hospitalization, as well as disruption in work, social, and family life (Weissman et al., 1999). Understanding how the symptoms of depression differ between adults and adolescents has been a subject of debate, thus understanding this difference is critical for accurate diagnosis and early prevention and intervention.

In a study examining 121 depressed adolescent outpatients Crowe, Ward, Dunnachie, and Roberts (2006) identified that the most common symptoms reported by both boys and girls was being grumpy or irritable. Other concerns which were most common among boys were problems talking, sleeping, concentrating, making decisions, and feeling restless. In contrast those reported as most common among girls were feeling lonely, unhappy, self-hate, and crying. However,

problems with sleep, concentration, and decision making were in the top 10 symptoms for both boys and girls. The authors continue with a discussion regarding severe irritability as the most prevalent symptom across the sample and how it is often dismissed as developmentally typical behavior even though it satisfies one of the diagnostic criteria for adolescent depression according to the DSM-IV-TR [now DSM 5].

Overview of the Study

This exploratory study seeks to examine the relationship(s) between quantity of specific positive and negative memories and predictions and how it may predict the presence of mental health concerns such as depression, anxiety and stress. The present experiment contributes to the current research base by attempting to replicate in part the study methodology used in previous research examining this relationship with an adolescent population. Specifically, the target sample size was larger than that of previous research and the target number of sites being sampled from was larger than that of previous research. Participants for the present study were sampled from two medium to large secondary schools in the suburban north eastern United States. Additionally, depression, anxiety, and stress were examined as three independent constructs measured by the Depression, Anxiety, and Stress Scale 21 Item (DASS 21) (Lovibond & Lovibond, 1995) which is consistent with the foundational theory of the study that different patterns of thinking lead to these different negative cognitive and emotional states. This section outlines the problem addressed, presents the research questions, provides an outline of the research methodology and instrumentation, and discusses the potential limitations of the methods.

Statement of the Problem

This exploratory study sought to examine the relationship between quantity of specific prospective and/or retrospective cognitions in adolescents and how one and/or the other may predict negative mental health outcomes such as depression, anxiety, and stress. Historically there have been a series of studies carried out which examined this specific relationship in adults (MacLeod & Byrne, 1996; Macleod & Conway, 2007; Macleod, Byrne, & Valentine, 1996; Macleod, Tata, Kentish, & Jacobsen, 1997; Macleod & Salaminiou, 2001; Stober, 2000), however few studies have been carried out to examine this relationship in adolescent and young adult populations. Only one previous study conducted by Miles, MacLeod, and Pote (2004) could be found where this particular relationship between cognition and affect is examined with an adolescent sample ranging in age from high school to early college. While this previous research was ultimately inconclusive due to a long list of reported limitations they did note that there were some important implications based on trends in their data, however a larger sample from a more diverse selection of schools was necessary to better examine these relationships.

Purpose of Study

The objective of the present study was to replicate the core methodology of previous research with the addition of a larger sample from a more diverse selection of school environments (e.g. urban, suburban, rural, etc.). The primary data collection task mirrors that of most previous research on this particular subject, however unlike some previous research the present study used a single 3 part measure of depression, anxiety, and stress that bases its foundation on a tripartite model (depression, anxiety, and stress) of negative affect unlike most previous research which only focused on depression and anxiety. Additionally, the present study also adds a measure of hope (Snyder et al., 1997) as previous researchers were unsure as to how

adolescents may experience “hopelessness” (Miles, MacLeod, & Pote, 2004) and how it might relate to the other measures such as positive future cognitions.

Research Question

The primary research question for this exploratory study examines the relationship between the surplus or deficit of positive future expectations and the likelihood that an individual will suffer from the signs and symptoms of depression. The hypothesis is that a higher number of positive future expectations is predictive of fewer signs and symptoms of depression over and above the influence of the already established construct of hope as defined by Snyder (1997) in secondary and early college students between the ages of 14 and 19 years old. It is further predicted that the influence of positive future expectations on depression symptoms should be mostly independent of negative future expectations.

Research Methods

A sample of student volunteers ranging in age from 14 to 19 years old were recruited from a combination of one suburban northeastern United States secondary school, one rural north eastern United States secondary school, and one large rural northeastern public university. Participants in this study completed one cognitive task consisting of 15 one minute segments examining both event prediction and event memory as well as a control task, they also completed two scales, one which measured their state affect (depression, anxiety, and stress) and one that measured their “hopeful disposition” (Snyder, 1997). This data collection took place in one of two possible formats dependent upon where the participants were recruited from. Those participants recruited from the secondary schools completed the activities in a private conference room while supervised by study personnel. Those who participated at the university level

completed their tasks on a self-guided web application that was timed when necessary and made available via the university's email listserv.

Hierarchical linear regression was used as the primary mode of analysis for the research question comparing the overall variance in depression which is explained by positive future cognition over and above what was already explained by an individual's hope score. Additional analyses were conducted as well in a similar fashion examining the effect of negative future cognition on anxiety and negative past cognition on stress levels, both of which also controlling for the influence of hope. Hierarchical regression was used as it allows for particular control when examining the independent amount of variance which can be attributed to a specific variable when others are controlled for, however this does not allow for causal inferences. That being said it serves the purpose of the present study due to the nature of the research question and the particular study goals.

Instrumentation

The following measures were utilized in this study. Positive and negative cognition, both future and past, was measured via The Memory and Future Thinking Task (MFTT) (MacLeod et al., 1997) which consisted of 15 one minute listing tasks. Depression, Anxiety, and Stress were assessed via the Depression, Anxiety, and Stress Scale 21-Item version (DASS 21) (Lovibond & Lovibond, 1995) which was presented as a standard affect rating scale, and the Children's Hope Scale (Snyder, 1997) which is a 6-item rating scale intended for children and adolescents. These measures have shown adequate reliability and precedent for use with the present study population based on review of previous research and psychometric information provided by the developers. To ensure the integrity of these measures for the present study inter-observer agreement is reported for the MFTT via the Cohen's Kappa statistic.

Importance

The goal of this study is to contribute to the existing research on prediction, screening, and prevention of mental health concerns like depression and anxiety in school age adolescents and college students. This research attempts to expose any present relationship between the time period and valence of an adolescent's cognitions and the likelihood that that adolescent will suffer from the signs and symptoms of mental health concerns such as depression and anxiety. The results of this study may offer insight and direction for future research on developing screening tools and prevention techniques for adolescent mental health. In sum, the present study provides information on the relationship between adolescent mental health and their patterns of cognition as well as offers insight into the strengths and limitations of investigating this relationship using self-report prediction and recall tasks.

Limitations

This exploratory study utilized regression analysis, and thus does not allow for causal inferences to be made. This limits the study to establishing whether there is or is not a relationship between positive future expectations and adolescent self-reported depression symptoms, as well as other related comparisons. Additionally, the final sample of study participants did not reach the level of diversity which was originally desired. The majority of study participants were white college age women between the ages of 18 and 19 years old. Therefore, the information provided by the analysis is limited in its generalizability across the adolescent population. This information however does still provide important direction in understanding these relationships and their implications for adolescent mental health outcomes and potential intervention approaches.

Additionally, this study only utilizes one measure for each construct being examined, therefore issues related to measurement error may exist and interpretation of the results should be carried out with caution. Finally, there were several concerns raised regarding the Memory and Future Thinking Task (MFTT) (MacLeod et al., 1997). This measure appeared to suffer from a variety of limitations which will be discussed in chapter 5.

Overview of the Dissertation

In the following chapter, a more detailed review of the literature is provided relating to the relationship between affect and cognition, Hope Theory, current approaches to depression treatment, and the relationship between adolescents and future thinking. There will also be a particular emphasis on the relationship between the temporal orientation (future vs. past) of cognition and the suspected relationship it has with mental health outcomes. Finally, a summary of the relevant literature and a brief discussion of how each concept relates to the overall foundation of the present study will be provided at the conclusion of the chapter.

In Chapter 3, a detailed overview of the methods and procedures carried out in this study are provided and summarized. The first portion of the chapter outlines the sampling procedures, and the second section outlines the instrumentation used and provides relevant information necessary to understand the purpose of each measure and the particular constructs each measures. The third section explains the data collection procedures, and in this particular study this is separated into two sub-sections given that the data collection was carried out in two separate settings and in two separate modalities. The fourth section presents and describes the specific statistical analyses utilized.

In Chapter 4, the results of the aforementioned analyses are provided and summarized, via text, tables, and graphical representations. The general assumptions of multiple linear regression

are examined and suppressor effects among the variables are considered. The results of the hierarchical linear regression model utilized to test the primary research question are provided, as well as some additional related comparisons.

In Chapter 5, the implications of the study are presented and discussed in detail. The findings are examined and the theoretical relevance is assessed and discussed as well. The limitations of the study are discussed in great detail as there are important considerations which must be addressed with regard to the limits of the sample as well as the limits of one of the tasks which acted as an independent variable. The dissertation ultimately concludes with a discussion of the implications this study offers for future research and possible adjustments that might be made in future studies to better examine the constructs of interest.

CHAPTER 2

BACKGROUND OF THE STUDY

This review of research provides background and overview of factors involved in the relationship between thoughts and emotions, as well as discussion of specific theories and practical applications relevant to the present study. In the first section the relationship between emotions and thoughts is examined via a review of a specific line of research conducted by Dr. Andrew McLeod and his colleagues which focuses on two main points. The first is that positive and negative affect are not two ends of a continuum, but that they are two related yet independent constructs, and second that given the independence of positive and negative cognition it is theorized that only the absence of positive expectations about the future is necessary to predict present or future depression symptoms, independent of negative expectations about the future and past experiences.

The second section will discuss current approaches of assessment for mental health concerns, especially depression, and also review a selection of current treatment modalities. The third section will consist of a brief description and discussion of Snyder's "Hope Theory" (Snyder, 2002). The fourth section will discuss the relationship between adolescents and future thinking. Finally, a summary will be provided highlighting the specific elements which were critical for the present study design.

A Perspective on Affect and Cognition

The relationship between cognition and affect may be far less clear than was once presumed. Research findings from the late 1990's suggest that positive affect and negative affect are likely not two ends of a single cognitive emotional continuum, but are instead the result of a relationship between positive and negative cognition as independent factors, forming two

separate and functionally related constructs (Macleod & Byrne, 1996; Macleod, Byrne, & Valentine, 1996).

MacLeod, Tata, Kentish, and Jacobsen (1997) examined how memories of past events and expectation of future events were related in adult patients with panic disorder, those with depression, and a control group with neither. Their findings indicated that those patients diagnosed with depression reported a significantly lower number of positive expectations about their future, but did not differ significantly from the control group in number of self-reported negative expectations of the future or negative memories. Likewise, those participants diagnosed with panic disorder had a significantly higher number of negative expectations about their future and recalled far more negative memories than the control group, but they did not have a significant deficit in positive expectations about the future. The authors suggested that the cognitive mechanisms behind disorders like depression and anxiety, and the role that the two polarities of cognition play in emotion, are likely inherently different and should be treated as such in clinical settings.

Stober (2000) conducted a study similar to that of MacLeod, Tata, Kentish, and Jacobsen (1997) with an alternative non-clinical sample. Their methodology was comparable regarding the present cognitive and affective state of participants, and measuring positive and negative predictions and memories across time. Although they used alternative dependent measures, they targeted the same constructs (e.g. depression, anxiety, etc.) and their results were consistent with earlier findings. Additionally, further study with clinical participants was conducted by Macleod and Salaminiou (2001) who examined the present state of inpatients suffering from depression, and confirmed that within their sample the trend in the data was consistent with previous research regarding the relationship between positive and negative affect and depression and

anxiety respectively. These studies furthered previous findings by supporting the proposed theory that a significant deficit in positive cognition about future is often responsible for negative changes in affect. This may potentially lead to depression symptoms, even in the absence of significant changes in negative cognition or experience. It appears that both negative and positive cognition play a unique role in the manipulation of affect, in that one type of cognition, positive or negative, has the power to produce significant affective change, independent of the other.

More recent investigations have focused research on the relationship of positive cognitions, specifically future-directed, and overall emotional health, as well as how individuals attribute the cause of these positive beliefs to themselves and others. Macleod and Conway (2007) reported that participants with low "well-being" were still able to produce positive future predictions when asked, but they repeatedly failed to attribute those events to themselves – instead, they shifted attention to other proximal individuals like friends and family. This study highlighted that the possible cause of depression may not necessarily be the inability to conjure any potential positive prospective beliefs, but rather the ability to attribute those positive beliefs and events to themselves. Therefore, the authors suggest that a significant implication of the study is that intervention should mainly focus on both increasing the production of positive future expectations as well as ensuring that participants actively attribute those expectations to their own lives.

A follow-up theory by Sohl and Moyer (2009) attempted to refine previous research on the interaction of future oriented cognition with positive and negative affect by exploring two forms of planning for future events or "Proactive Coping". Distinct differences between negatively and positively charged future oriented thinking were exposed in the findings. The two primary coping models were contrasted: a "positive model" – resource accumulation and

facilitation of precursor events (Schwarzer & Taubert, 2002) – and a "negative model" – preparation for or the avoidance of future stress (Aspinwall & Taylor, 1997). Results indicated that both strategies shared much of the variance in overall well-being; however, the positive model was, as predicted by the authors, responsible for a much greater portion of positive well-being, over and above the negative model. Ultimately they suggested intervention should focus on teaching acquisition of resource strategies and positive realistic goal setting to enhance positive expectations about the future, as the theory predicts more feasible and frequent the positive future events appear the fewer depressive symptoms an individual should have.

Primarily the studies on this theory have dealt with clients and/or patients who were sampled as moderately to severely depressed, or not depressed at all. However Bjarehed, Sarkohi, and Andersson (2010) examined cases of mild to moderate depression and whether they would yield the same or similar findings. Their study found that moderately depressed patients' self-reported fewer positive future expectations, and no discernible difference in negative expectations as compared to a control group. These results were consistent with previous research and occurred in both mild and moderate cases of depression within the study sample. Participants still exhibited the same difficulty in producing positive future expectancies, and this led the researchers to conclude that clients who exhibit less severe symptoms, even sub-clinically, may still benefit greatly from interventions focused on the promotion of positive future expectations.

Over the course of the decade or more of research on this subject, there has been only one study which targeted the validity of the aforementioned theory with an adolescent or child sample. Miles, Macleod, and Pote (2004) explored this topic briefly, believing that anxiety and depression would have a similar relationship with positive and negative cognition in adolescents

as it does in adults. Although their results were inconclusive, and by their own admission suffered from significant limitations, including low response rates and participants who were sub-clinical at the time of measurement, the investigation did provide meaningful insight on the application of this theory with adolescents in Australia.

An additional limitation in this study was that they only sampled from two schools, and their initial sample size was 226 students, of which 123 responded and participated. Few if any students suffered from a clinical level of either depression or anxiety, calling into question whether the sample was diverse and/or clinically severe enough to detect significant differences. They also did not investigate whether other factors specific to adolescent populations, such as a cognitive capacity to experience "hopelessness" (Kovacs & Paulauskas, 1984) or the construct of hope itself, as defined by Snyder (2002), were responsible for any moderating effects. Thus at this time it remains relatively unknown how precisely increased or decreased amounts of regular positive or negative cognition may influence the mental health of the adolescent population. Additionally, determining whether or not there are population specific factors, such as a high or low hope disposition, was a specific limitation that the authors acknowledge.

Approaches to Treatment and Assessment

Two core approaches to treatment of depression tend to stand out among the others, aside from psychopharmacological treatment, Cognitive Behavioral Therapy (CBT) and Interpersonal Therapy (IPT) (National Institute of Mental Health, 2011). CBT focuses on adjusting the way adults and adolescents develop thought patterns, helping to reframe things in a positive way, as well as catch and correct erroneous thoughts that may not be realistic or rational. IPT focuses on the resolution of particular relationships which could be generating conflict in the client's life and subsequently exacerbating their depression symptoms.

Likewise, the assessment of depression or the risk for depressive symptoms often comes in one of two forms or ideally both. Generally, a client either completes a self-report measure which produces a standard score that indicates severity of symptoms in comparison to a normative sample, or a client may be assessed by a clinician via an interview in tandem with the collection of input from other individuals who live and/or work closely with the client via additional rating scales and/or interviews. Following that a comparison of those results with the DSM 5 criteria for depression or other potential disorders is carried out.

While the aforementioned method is comprehensive and appropriate for clinical settings, it requires a good amount of time, multiple sources of information, and does not offer a good metric for progress monitoring during treatment. If the theory proposed by MacLeod and colleagues can demonstrate risk of depression with a simple listing task it may be a much faster and easier way to screen for adolescents at risk as well as provide a continuous measurement variable to use in monitoring the progress of intervention.

Hope Theory

The theory proposed by MacLeod and colleagues bears a strong resemblance to some elements of Snyder's (2002) "Hope Theory". Snyder presents hope as less of an emotion, and more a matter of thought process by which the future is processed. He also indicated that there are specific cognitive mechanisms involved in affect, and that barriers and limitations impeding individual goals and desires will be interpreted in different ways depending upon whether the individual possesses one of two dispositions, a "high hope" disposition, defined as being "less likely to construe the impediments [to goals] as stressful—at the beginning and throughout the temporal process of the goal pursuit (Snyder, 2002, p. 252)", or a "low hope" disposition,

defined as being more susceptible to those impediments and the resulting stress throughout the goal pursuit process.

These cognitive tendencies are based primarily on individuals' expectations about how things in the world around them will influence their immediate and future lives, and how they can attribute and cope with those expectations. Therefore Snyder designed a measurement of hope that may contribute to the investigation of the cognitive mechanisms which govern adolescent affect.

Dispositional "Hope" as Snyder (2002) defines it may interact with positive and negative cognition and influence the overall expression of adolescent affect, resulting in resilience for those with a high hope disposition, and subsequently fewer depressive symptoms at any given level of positive cognition, as well as it may require a more severe deficit of positive cognition before depressive symptoms are detectable. This presents an additional layer when interpreting how positive and negative cognition may predict depressive symptoms, as an individual's level of dispositional "Hope" may moderate the necessary level of positive or negative cognition to exhibit clinical symptoms. However, when both theories are examined in tandem it may reveal a more robust ability to predict depressive symptoms in adolescents.

Adolescents and Future Thinking

Given the differences between adolescents and adults in both cognition and affect, it would behoove researchers to understand the congruency of the theory proposed by MacLeod and colleagues with the way adolescents construct their thoughts about the future. During adolescence the cognitive abilities that are needed for constructing future oriented thought, positive or negative, begin to solidify (Kuhn, 2009) and this may be the first time in an

individual's life where future expectations become a large contributor to positive and negative affect and influence their vulnerability to mental illness such as depression.

Gott & Lah (2014) examined the change in past and future episodic and semantic thinking and the transition from childhood to adolescence. Based on their findings it appears that a strong relationship may exist between an individual's ability to generate potential future events and their ability to recall past memories. A highlight in the article was that past memories tend to be episodic and the prediction of future events requires both the retrieval of information from those past memories and the merging of that information with anticipated future contexts. They also highlight that adolescents in the study recalled significantly more episodic and semantic memories as well as producing episodic and semantic predictions over and above the child participants, suggesting that there is a distinct maturation of this cognitive process at this point in development.

These findings are consistent with the Constructive Episodic Simulation hypothesis (Schacter, Addis, & Buckner, 2007) which suggests that adults form potential future events as the result of recombination of details from the past into a potential template for the future given context. Therefore the findings of Gott and Lah (2014) demonstrate that there are similarities between how adolescents and adults form future oriented predictions, and lend some credence to the application of MacLeod's theory to early and late adolescence. Gott and Lah (2014) also note that gains in executive skills, particularly working memory, was associated with a significant increase in recall of episodic details and has some relationship with the generation of future predictions. Therefore, given the profound change in executive function skills that takes place during the transition from childhood to adolescence it is reasonable to believe that these abilities would improve.

Summary

A variety of research in affect and cognition supports that the components necessary for the application of the theory proposed by MacLeod and colleagues to an adolescent population are present in the adolescent literature. However, how well it applies or how best to measure it has only been considered once before by Miles, MacLeod, and Pote (2004). A single study of this theory as applied to an adolescent population is not enough to draw significant conclusions, additional research examining the relationship between past and future cognition and affect is necessary. As adolescents begin to examine their future as a potential source of hope or despair aiding them in shaping these thoughts may be a meaningful approach in reducing mental health concerns such as depression and anxiety by boosting positive thinking about the future and limiting negative thinking.

CHAPTER 3

RESEARCH METHODS

A detailed review of the methodology used in this study is presented in this chapter. The first section describes the procedures used to recruit participants from both a large New England research University and a selection of 2 secondary schools around the state of Connecticut. In the second section the measures and instrumentation used are described, as is any relevant psychometric information. In the final section, the analysis procedures are summarized.

Sample

In this section the procedures implemented to recruit participants for this study are introduced, as well as general discussion regarding the demographic characteristics of the sample and the limitations which made the demographic data difficult to interpret. The sampling procedures including formal recruitment process, description of the research settings, and inclusion criteria are discussed in the first subsection.

Sampling Procedure

After having the recruitment procedure approved by the University of Connecticut IRB to conduct the study, a selection of high school administrators across the state of Connecticut were contacted to seek permission to offer participation in the study to the students attending their schools. Out of the dozen or more high schools solicited only two schools responded to recruitment correspondence and ultimately agreed to allow their students to participate in the study. Once proper approval documentation was acquired study recruitment information scripts were distributed to the participating schools and it was requested that each homeroom teacher read the script aloud to their students and then provide those students interested with further information and consent forms. Those students that indicated interest and returned consent forms

either signed by themselves if 18 years of age or older or by a parent or guardian if not were included in the study.

Additionally, given the relatively low response rate from high schools the University listserv at a large research university in New England was used to recruit additional college students who were age 18 and19 years old. This recruitment took place first by obtaining approval of a participant recruitment email draft from the administrators of the university listserv, followed by repeated publication of the recruitment materials and links to the online version of the study intermittently over several months. Students who opted to complete the study via the online version were provided with information on the first page of the survey with instructions to click "OK" to proceed if they agreed to participate. Signed consent was waived by the IRB for the online version as it was entirely anonymous and only individuals over 18 were included.

Setting.

The setting of this study was twofold, one version was conducted on paper and in person in conference rooms at 2 public high schools across a small northeastern state in the United States. Between the two high schools a reasonably diverse and gender equivalent population of approximately 4,000 to 4,500 students were presented with the recruitment materials. The towns in which these schools are located have a range of residents of all levels of economic need. Both schools provide a 4 year education within the standards set forth by the state department of education and have a high number of students who continue on to some form of postsecondary education.

The other setting was an anonymous online version of the task and survey conducted at a large research university in the north eastern United States. The study was completed on the

participant's personal computer at any time and from any location with an active internet connection. The survey was self-directed with some timed elements which would automatically advance the participant after a set period of time.

Sample Recruitment.

All students who attended the two high schools were provided with an information sheet along with the permission forms necessary for the students' parents to permit them to participate. Between both schools only 18 students returned signed permission forms, thus the sample from the high school population was quite small relative to the anticipated rate of participation. The University students were presented with a brief statement about the topic and structure of the study along with a link to the survey itself within an email on the university student listserv. This recruitment correspondence was repeatedly sent to the entire undergraduate student body and the online version of the study was open to participants for approximately 6 months. During this time 141 university students completed the survey in it's entirety as incomplete entries were not included in the final data analysis.

Inclusion criteria.

The inclusion criteria for this study were few but specific. Each participant had to be between the ages of 14 to 19 years old. The participants also had to be able to fluently read and write in English. Given this study's particular recruitment methods it was also consequently understood that they would have to be a student attending either a public high school or university. No other criteria were considered for the purposes of recruitment or inclusion from study participation.

Sample Demographics

The demographics of the 159 participants who chose to participate and met the inclusion criteria consisted primarily of white females attending the participating university. Males were

vastly underrepresented, even after the greater prevalence of depression in women is taken into account (Martin, Neighbors, & Griffith, 2013). Additionally, due to omitted demographic data it is difficult to determine the proportion of other ethnicities and the exact ages of the participants. Bearing that in mind the age bounds of this study (14-19) were a prerequisite for participation so the concerns and uncertainty fall more in the exact age and not whether or not the participant was within the appropriate range, particularly with regard to potential analysis that takes age into consideration. Socioeconomic data were not requested in the demographic survey. These limitations are important to consider and will be discussed in Chapter 5 and other sections which examine the limitations and directions for future research.

Apparatus and Variables

The measurement tools selected for this study were based on the applicability to the constructs being measured as well as sound psychometric properties. Additionally, some were included as a necessary component of replicating past research and did not necessarily provide psychometric properties. The lack of psychometric information for the Memory and Future Thinking Task (MFTT) will be discussed further in Chapter 5 where elements of this study will be examined and discussed regarding the limitations within the context. Data were collected via the survey tools and cognitive tasks in two different ways: a group testing session held in person within public schools which lasted approximately 45 minutes supervised by a proctor and an online survey completed independently via a link to Surveygizmo.com which was completed at the participants chosen pace, but would last at minimum 20 minutes. The group testing was composed entirely of high school age students (14-18) and the independent online form was composed entirely of university age students (17-19). Both formats contained the exact same

surveys and cognitive tasks and all participants were given the same time limits for the time sensitive portion of the survey.

Dependent Variables

This study utilized three specific constructs as dependent measures as each was presumed to be related to each other and was measured using the same questionnaire. The Depression Anxiety and Stress Scale 21-Item Version (DASS 21) (Lovibond & Lovibond, 1995b) was a reliable and validated short form version of the Depression Anxiety and Stress Scale (Lovibond & Lovibond, 1995b) which is 42 items. The DASS 21 is a validated self-report measure of depression, anxiety, and stress, reporting a Cronbach's Alpha of .94, .87, and .91 respectively. Additionally, this measure is highly correlated with other similar measures with a sample of 290 clinical and non-clinical participants (Antony, Bieling, Cox, Enns, & Swinson, 1998). Beyond the general psychometrics the DASS 21 was also examined for reliability and validity with adolescent populations where it exhibited adequate Cronbach's Alpha properties, depression (.88), anxiety (.89), and stress (.82), with an overall reliability of .93 (Tully, Zajac, & Venning, 2009). It was used as the primary and only measure of depression, anxiety, and stress. Within the present study the Cronbach's Alpha properties were also computed for each of the three subscales within the DASS. The Depression scale consisting of 7 items produced an Alpha of .897, the Anxiety scale consisting of 7 items produced an Alpha of .838, and the Stress scale consisting of the final 7 items produced an Alpha of .830.

The DASS was initially validated in the seminal research of Lovibond and Lovibond based on the development of contemporary theories of negative affect (Beck, Epstein, Brown & Steer, 1988; Costello & Comrey, 1967) and presented in the DASS manual (Lovibond & Lovibond, 1995b). Based on the literature and previous pilot work there was no compelling

evidence that negative affect states were experienced differently by clinical versus non-clinical participants, and thus the development of the scales was carried out with non-clinical participants. Their sample consisted of both men and women drawn from university classes and clinics, as well as employees from a major airline, a bank, a railway workshop, and a naval dockyard. Validity checks were reportedly carried out with clinical outpatients diagnosed as suffering from anxiety and depressive disorders. The authors report that they began with a smaller number of items which were selected for the likelihood of tapping core symptoms of either depression or anxiety, not both. All analyses beyond their initial item check with clinical subjects were done so via multiple group factor analysis (Harman, 1976). They report that the strategy used was called Simultaneous Multi-Scale Dimensioning (SMD).

The total set of items which were determined to be appropriate via the initial check were administered to 950 first year university students and the 504 students with the highest combined depression and anxiety scale scores were retained for multiple groups factor analysis. The addition of the stress scale came after the initial assessment of the anxiety and depression scales. Six new samples were drawn and similar to the previous procedure factor analysis was performed. The viability of the stress scale was confirmed and the final sample utilized was N=1750. The mean inter-scale correlations for the sample were Depression/Anxiety = 0.55, Anxiety/Stress = 0.68, and Depression/Stress = 0.60. These results were consistently replicated in later independent samples and the factor structure was confirmed by exploratory and confirmatory factor analyses.

The literature appears to support the core tripartite model of negative affect for which the DASS is based on when assessing adolescents (Szabo, 2010; Willemsen, Markey, Declercq, & Vanheule, 2010). Willemsen, Markey, Declercq, and Vanheule (2010) indicated that the

underlying tripartite model of the DASS 21 is supported in an adolescent sample of 677 non-clinical adolescents in Belgium. The primary purpose of the utilization of the DASS 21 in the present study was to provide an accessible and accurate measurement of Depression, Anxiety, and Stress in the adolescent population being sampled. The research presented by Willemsen, Markey, Declercq, and Vanheule (2010) indicates that their findings are in line with other studies regarding a 3 component structure of negative emotionality and supports the validity of the tripartite model underlying the DASS-21 with adolescent boys and girls. Additionally, Marianna Szabo (2010) also indicates that in exploring the factor structure of the DASS 21 in a younger sample of 484 high school students, evenly split between boys and girls with a mean age of 13.62, a model consistent with the factor structure of the standard DASS provided a good fit to the data. Her final assessment however when another model was tested was that while the structure of depression and anxiety appear to be similar in adults and adolescents, the stress factor could possibly be broken down further into a tension and/or stress thus suggesting a possible quadripartite model. That being said for the purposes of this study the evidence supporting the use of the DASS 21 with adolescent populations appears to be adequate.

Validation of the construct validity was further reinforced via correlations between the DASS subscales and previously well-established measures of the related constructs. The Beck Anxiety Inventory (BAI) (Beck & Steer, 1990), Beck Depression Inventory (BDI) (Beck & Steer, 1987), and the DASS were administered to 717 first year psychology students at an Australian university. The correlations between the scales were generally reliable, and as hypothesized by the authors the DASS depression scale and DASS anxiety scale were highly correlated with the BDI and BAI (r=.74 and r=.81 respectively). It was also reported that the slightly lower correlation between the DASS depression scale and the BDI was likely due to the

BDI assessing somatic aspects of depression and the DASS depression scale focusing primarily on the cognitive features, however according to the authors the somatic aspects are less predictive overall of depression diagnoses. This was concluded after a further factor analyses to further examine the unique contribution of each scale to the variance in the respective domain and any overlap.

Some concerns do exist however with using the adult version of the DASS 21 with youth populations (Patrick, Dyck, & Bramston, 2010). Unfortunately, at the time of this study an alternate form of the DASS for adolescents was not available and the adult form was used. However, an *Adolescent DASS 27* item alternate version tuned to better suit adolescent populations is in development (Fowler & Szabo, 2012) and may be a meaningful tool in future research involving adolescent depression, anxiety, and stress. Even with this limitation the adult version the DASS 21 is considered valid for individuals 14 years of age or older, as per the information provided on the DASS website ("10. Can the DASS be used with children / adolescents?", n.d.) Even though the primary construct of interest for this study was depression, both anxiety and stress were also examined, given their influence on related patterns of thinking in adolescents.

Independent Variables

This study had 3 independent variables, the first being a score on *Memory and Future Thinking Task* (MFTT) (MacLeod et al., 1997), the second a control measure of Verbal fluency called the "Word Writing Task" which utilized the FAS (Lezak, 1976), and third a control measure of hope via the *Children's Hope Scale* (CHS) (Snyder et al., 1997) as it was hypothesized that hope as a construct may share variance with the cognition measured by the MFTT when predicting Depression and possibly other dependent variables.

Predictor Variables

Memory and Future Thinking Task (MFTT). The MFTT is a self-report listing task consisting of a participant's memories and expectations of both positive and negative events in their lives (See Appendix A) and has been used in the past to measure positive and negative prospective and retrospective cognition. The research produced by MacLeod and Byrne (1996) and Macleod et al. (1997) indicated consistency in the patterns of responses in the number of positive/negative and future/past cognitions provided and the disorders hypothesized to be related to them (e.g. fewer positive future expectations, independent of negative, consistently correlated with depression).

The consistency and thus usefulness of this task as a measure of cognition was further established in other research studies as well. Stober (2000) indicated that participants who reported higher levels of depression also reported relatively lower quantities of positive future thoughts on the MFTT, and that enhanced imagery of future negative thoughts (high quantity of listed items) was significantly more related to anxiety than anything else. Likewise Bjarehed, Sarkohi, and Andersson (2010) found that depressed participants generated fewer anticipated positive future events on the MFTT, and did not differ from controls in terms of future negative events, even when that depression was mild to moderate. Now with particular relevance to the present study Miles, MacLeod, and Pote (2004) piloted the use of the MFTT with an adolescent sample in an attempt to validate MacLeod and colleagues' theory and present important considerations. They indicate that there is no data to suggest which method of presentation (e.g. keyboard, hand written, spoken, etc.) is most reliable for the MFTT, however they did compare the recall between the control and experimental groupings and there was no notable difference suggesting there is consistency between cases. The conditions used in their implementation were

identical only differing in the means of recording responses (i.e. computer keyboard typing versus hand written). Miles, MacLeod, and Pote (2004) did not indicate any procedural or validity problems with the MFTT and its application to an adolescent sample during the implementation of their study.

The MFTT contained 4 prompts, each with three sub-sections. The prompts were Positive Future thoughts, Positive Memories, Negative Future Thoughts, and Negative Memories, each with sub-prompts which asked participants to think about the time periods of 1 week, 1 year, and 5-10 years, and recall memories or produce expectations for those periods of time. The positive and negative cognition prompts and those regarding the future and the past were counterbalanced in the paper administration and randomized in the online administration to provide ideal assessment. Participants were allowed 1 minute to think of as many events as they could for each time period within each of the 4 sub-sections, and the score was the total number of items listed by the participant.

Delivery of this task was in the format used by Miles, MacLeod, and Pote (2004), where students recorded their responses in writing, and in this case also in typed text. Using the original format of verbal responses (MacLeod et al., 1997**)** with a sample this size would have been too logistically restrictive. All responses were coded against marking criteria by the experimenter and a hired data coder, and interrater reliability computations were conducted using Cohen's Kappa statistic (Cohen, 1960).

Future Cognition. The future oriented portions of the MFTT required participants to think about events or experiences they might have in the future according to 3 time periods, the next 1 Week, the next 1 Year, and the next 5-10 Years. Each time period was a separate task and the participant had 60 seconds to produce as many prospective cognitions as possible. The time

periods were not intended to show any significant differences, but in the original study (MacLeod et al., 1997) piloting indicated that participants were more capable of producing responses when a specific time period cue was provided. The future oriented portion consisted of two conditions, Positive Future Cognition and Negative Future Cognition.

Past Cognition. The past oriented portions of the MFTT required participants to think about events they had experienced in the past and use their autobiographical memory to produce those events within the same three time periods as the future oriented conditions. Likewise, the breakdown of time periods, time limit, and measurement was the same as the future oriented conditions except the time periods were expressed as the past week, the past year, and the past 5-10 years similar to the original study (MacLeod et al, 1997). The negative oriented portion consisted of two conditions, Positive Past Cognition and Negative Past Cognition.

Since the MFTT was designed and carried out as a simple cognitive task and at the time of its original use was not presupposed to measure anything other than exactly what the participant produced there is not available information regarding its validity as a measure of future and past cognition. So for this study it was used simply scored as frequency data for each condition as it was in previous studies which utilized it. However, going forward there are many limitations indicated by the results of examination and analysis of the data, this will be covered further in Chapter 5 when discussing the limitations of the independent variables and related measurement tools and tasks.

Control Variable.

Word Writing Task (FAS).

The word writing task modeled on the FAS (Lezak, 1976) was used in the original study (MacLeod et al, 1997) as a standard task measuring general verbal fluency (See Appendix B).

This task was randomly sorted in with the different conditions of the MFTT and asked the participants to provide as many words as they could produce which started with the letters F, A, and S, excluding proper nouns, numbers, the same word with different suffixes, and repetitions. This task was presented in the same fashion as the MFTT, the difference being that F, A, and S took the place of 1 week, 1 year, and 5-10 years respectively.

The FAS was evaluated via two forms of reliability, the first was internal consistency which indicated a Cronbach Alpha coefficient of r =.83, and the second was a measure of test-retest reliability conducted on 38 older participants who had taken the FAS on two occasions separated by 5.6 years which indicated it was within appropriate limits (r=.74, p<.001) (Tombaugh, Kozak, & Rees, 1999). In the present study the purpose of this measure was simply to ensure that the participants could produce a number of English words fluently to suggest they were capable of producing appropriate responses to the other MFTT condition.

Potential Moderating Variable

Hope (CHS).

The *Children's Hope Scale* (CHS) (Snyder et al., 1997) was used as a measure of the participants' degree of dispositional hope (See Appendix C). It is comprised of 6 items each rated on a 6 point Likert scale where each point was provided a qualitative descriptor such as "none of the time" to "all of the time". This measure was originally intended for and determined to be internally consistent (median Cronbach's alpha =.77) with children and young adolescents, ages 8-16. The first step Snyder and his colleagues took in development of this scale was to derive an initial scale (originally 12 items) and administer it to a sample of 197 boys and 175 girls 9 to 14 years of age in a public school. Based on the results of factor analysis 6 items were removed due to weakness and the remaining 6 items were again subjected to the same factor

analysis. To further confirm the factor structure the now 6 item Children's Hope Scale was again administered to the same sample of children 1 month later. The analysis of the second round of administrations revealed a similar pattern of item loadings to those obtained previously, and were positively correlated with one and other.

Snyder et al. (1997) demonstrated convergent validation by correlating the self-report responses of the child and adolescent participants with those of their parents when the personal pronouns were changed from the first to the third person, assuming a child's true hopeful disposition should be directly related to that which would be reported by their parents for them. As the authors predicted the ratings of the Children's Hope Scale correlated positively and significantly ($p<.01$) with their parents ($r=.38$) and again at 1 month delayed ($r=.37$).

Discriminant validation was performed by comparison of the CHS to the only other hope-related measure at the time, Kazdin et al.'s (1983) Hopelessness Scale. The results of a correlational analysis indicated a negative relationship as predicted, but did not reach statistical significance. It was also concluded that based on previous research and the reasoning of Snyder and colleagues that it is unlikely that the results of the CHS are simply a reflection of basic intelligence, as it did not correlate significantly with the WISC-III (Wechsler, 1991) at the time.

Further and more recent research via confirmatory factor analysis completed by Valle, Heubner, and Suldo (2004) indicated that in addition to its intended population of children and young adolescents it is an adequate measure of hope for adolescents ages 15-19 as well, with a Cronbach's alpha reliability of .84. The present study data produced a Cronbach's Alpha for the CHS of .889.

Demographic Information

Following the dependent and independent variable questionnaires a demographic survey was presented asking participants to provide their age, gender, ethnicity, and grade level (See Appendix D). The purpose of this was to accumulate other participant specific information about the sample to be reported along with the study results and potentially be used as independent variables in analysis. Unfortunately, sub-group analysis was either impossible for some of the data or unnecessary based on the overall sample. For example, given the profound disparity between male and female participants conducting any analysis of gender difference was not possible, and so on with all other demographic categories due to missing data or lack of diversity in the sample.

Analysis

Hierarchical linear regression was used as the primary method of analysis for the data collected in this study. This involves the comparison of sets of variables which may contribute to the prediction of a dependent variable. Each of these predictors is added one at a time to the regression model and the models are examined to determine the least complex model necessary to account for the most variance in the dependent variables. It is important to consider the complexity of the model as a highly complex model makes it more difficult to determine what the isolated influence may be of any given independent variable on the dependent variable. Therefore, simplifying the model affords more control in understanding which independent variables are truly responsible for the majority of the variance in the dependent variable.

In this study the primary interest was whether positive future expectations measured by the Memory and Future Thinking Task (MFTT) predicts depression while controlling for an individual's level of hope as measured on the Children's Hope Scale. This hierarchical model examined the contribution of the Positive Future Cognition (PFC) component of the MFTT in

predicting a participant's depression score on the Depression Anxiety and Stress Scale (DASS) over and above the control variable. The equation for this model is as follows:

$$\text{Model 1: } \hat{Y}\,(\text{Depression}) = \beta_o + \beta_1 * (PFC)$$

$$\text{Model 2: } \hat{Y}\,(\text{Depression}) = \beta_o + \beta_1 * (PFC) + \beta_2 * (Hope) + \beta_3 * (Interaction)$$

The regression coefficients in models 1 and 2 would be interpreted as indicated in Table 3-1

However, in addition to the primary model comparison, two other models of interest were examined to determine predictive power of Negative Past Cognition (NPC) on Stress while controlling for Hope (Models 3 & 4) and Negative Future Cognition on Anxiety when controlling for Hope (Models 5 & 6). The equations for these two models are as follows:

$$\text{Model 3: } \hat{Y}\,(\text{Stress}) = \beta_o + \beta_1 * (NPC)$$

$$\text{Model 4: } \hat{Y}\,(\text{Stress}) = \beta_o + \beta_1 * (NPC) + \beta_2 * (Hope) + \beta_3 * (Interaction)$$

$$\text{Model 5: } \hat{Y}\,(\text{Anxiety}) = \beta_o + \beta_1 * (NFC)$$

$$\text{Model 6: } \hat{Y}\,(\text{Anxiety}) = \beta_o + \beta_1 * (NFC) + \beta_2 * (Hope) + \beta_3 * (Interaction)$$

The regression coefficients in models 3 and 4 would be interpreted as indicated in Table 3-2 and the regression coefficients in models 5 and 6 would be interpreted as indicated in Table 3-3

The indicated regression coefficients for a given model represent the effect of the predictor variables after controlling for the other predictors in the model. The following sections provide a description of the considerations made when determining the statistical power of the model as well as the particular process used in carrying out the regression analysis in this study.

Table 3-1
Interpretation of regression coefficients for Models 1 & 2

Coefficient	Interpretation
β_0	The predicted value of Depression when all predictors are 0.
β_1	The predicted change in Depression for a one unit change in PFC when hope is equal to 0.
β_2	The predicted change in Depression for a one unit change in Hope when PFC is equal to 0.
β_3	The interaction between Hope and PFC when predicting Depression.

Table 3-2

Interpretation of regression coefficients for Models 3 & 4

Coefficient	Interpretation
β_0	The predicted value of Stress when all predictors are 0.
β_1	The predicted change in Stress for a one unit change in NPC when Hope is equal to 0.
β_2	The predicted change in Stress for a one unit change in Hope when NPC is equal to 0.
β_3	The interaction between Hope and NPC when predicting Stress.

Table 3-3

Interpretation of regression coefficients for Models 5 & 6

Coefficient	Interpretation
β_0	The predicted value of Anxiety when all predictors are 0.
β_1	The predicted change in Anxiety for a one unit change in NFC when Hope is equal to 0.
β_2	The predicted change in Anxiety for a one unit change in Hope when NFC is equal to 0.
β_3	The interaction between Hope and NFC when predicting Anxiety.

Statistical Power Considerations

The appropriate statistical power required to utilize hierarchical regression was determined by conducting a power analysis. Initially a sensitivity power analysis was carried out which determined that with an α error probability of .05, a power (β-1 probability) of .80, and 6 predictor variables (all possible predictor variables in the study) assumed to be in the equation, and a reasonable estimate of 200 participants, the minimum detectable effect size would be $f^{2=}$~.07 which falls approximately halfway between the "small" (f^2= .02) and "medium" (f^2= .15) effect sizes as proposed by Cohen (1992). However, a much larger desired sample of ~450 participants was proposed as it would have assured that the data analysis would have had the power to detect effect sizes closer to f^2 = .02. Unfortunately, neither the 450 nor 200 participant thresholds were met during recruitment.

When only considering the models proposed in the primary research question as well as the two additional questions being considered the sensitivity power analysis was again carried out with only 3 predictor variables assumed in the equation, the final number of participants recruited, and all other elements remaining the same. The results indicated that at an α error probability of .05, a 1-β of .80, 3 predictor variables, and 169 total participants the minimum detectable effect size is approximately f^2=.066, well within the bounds of minimally acceptable levels of statistical power needed in multiple regression to measure "medium" or greater effect sizes (Cohen, 1992).

Data-analysis Procedures

The first procedural step in the data analysis consisted of gathering all of the participant responses to the Memory and Future Thinking Task (MFTT) and coding at least 25% of completed tasks against strict coding criteria (see Appendix E) by two independent raters. Cohen's Kappa coefficient was calculated with a result of κ=.84, indicating substantial agreement (Viera & Garrett, 2005) allowing for the assumption that the interpretation of the coded data was valid and reliable (See Table 3-4).

Next, the raw MFTT data, Depression Anxiety and Stress Scale (DASS 21) data, and Children's Hope Scale (CHS) data were entered into an electronic database and imported into SPSS for analysis. For items on the MFTT, DASS, and CHS which were omitted the average of the participant's responses on other items on the respective scale was used in place of the omission. For example, if a participant recorded 0 entries for the Positive Future condition of the MFTT, and 10 each for the remaining 3 conditions, then 10 would be entered for Positive Future as it is the average of the other 3, likewise for the CHS. The DASS omissions were treated

somewhat differently as there are three subscales within the overall DASS. Therefore, omitted items on the DASS were replaced with the average of the responses for its respective subscale.

Once omitted items were computed and incomplete data were removed additional variables were computed to represent the overall scores on each measure. The MFTT items were computed as the sum of the total responses per condition, Positive Future, Negative Future, Positive Past, and Negative Past. The DASS provided 3 computed variables, Depression, Anxiety, and Stress as the sum of the items on each scale multiplied by 2. The CHS was computed by finding the sum of all items. Finally, responses were centered on the group mean of an item's respective task or measure, thus making comparisons easier to interpret.

Table 3-4

Summary of Reliability Calculation - Kappa Coefficient

Total Participants	Total Agreements	Total Disagreements	Pr(a)	Pr(e)	Kappa Coefficient
59	4055	99	.0976	.08506	.84

Summary

This study failed to recruit the target sample of 450 participants, as well as the secondary target of 200. The final participant total was 169 participants, however this was still an adequate sample for analysis and interpretation. The participant sample was primarily white college freshman and sophomore women, however the sample also included some college freshman and sophomore men (due to omission of demographic data age ranges and gender ratios could not be determined), 16 high school age girls, and 1 high school age boy. This sample size afforded the analysis the ability to detect effect sizes of f2 = .066 or above, short of the goal of "small" effect size detection, but well within the minimum limits of detection for "medium" effect sizes (f2=

.15) proposed by Cohen (1992). All participants who were included in analysis completed all tasks and measures fully, any item omissions were resolved as described above.

CHAPTER 4

RESULTS

Multiple regression is a method of assessing the predictive power of a given independent variable on one dependent variable with the addition of one or more other independent variables, producing a statistic which indicates the proportion of variance accounted for by the given independent variable ($\boldsymbol{R^2}$) in the dependent variable after controlling for the effect of any other independent variables (Chatterjee & Simonoff, 2013). While multiple linear regression does not allow for the drawing of causal conclusions it does provide a strong estimate of the influence of a given factor on the outcome of another, making it a valuable tool for use in all forms of scientific research. The next section of this chapter will address some of the pre-analysis information regarding the survey data, examining predicted concerns such as intercorrelation between variables and verifying the assumptions necessary for multiple regression analysis. The section following that will examine the fit of the proposed regression models and the predictive power of specific independent variables to derive an answer to the study research questions.

Pre-Analyses of the Primary Research Question

Going into the study there was concern that a moderate intercorrelation between Positive Future Cognition (PFC) and Hope would be present with regard to their prediction of the variance in depression. If PFC and Hope were found to share a considerable amount of the explanation of variance in depression then it raises doubt about the independence of the two variables which is a major assumption necessary for regression analysis resulting in suppression (Chatterjee & Simonoff, 2013). Given this concern it was decided that all independent variables in each regression model would be assessed for potential intercorrelation. The correlation table

of the variables (See Table 4-1) was used to assess the relationships. Additionally, a table of the means and standard deviations for the 8 dependent variables is provided below (See Table 4-2).

Table 4-1

Summary of Intercorrelations for Scores on Hope, Anxiety, Stress, Depression, Positive Future, Negative Future, Negative Past, and Word Writing

Measure	1	2	3	4	5	6	*7*
1. Hope	__						
2. Anxiety	-.440**	__					
3. Stress	-.435**	.688**	__				
4. Depression	-.580**	.649**	-.662**	__			
5. Positive Future	.254	-.089	-.121	-.195*	__		
6. Negative Future	-.145	.258**	.165*	.139	.537**	__	
7. Negative Past	-.042	.195*	.210**	.160*	.597**	.736**	__
8. Word Writing	.062	-.060	-.139	-.102	.314**	.164*	.291**

**$p < .01$.
* $p < .05$.

Table 4-2

Descriptive Statistics for the 8 Dependent Variables

	Means	Standard Deviations
1. Hope	-.0017	5.64822
2. Anxiety	-.0002	9.18349
3. Stress	-.0021	9.36769
4. Depression	.0030	10.26476
5. Positive Future	-.0047	5.51116
6. Negative Future	.0012	6.70213
7. Negative Past	-.0033	5.49542
8. Word Writing	.0005	12.19880

Within the proposed multiple regression models the common variable across all was Hope. Therefore, it was imperative that the independence of Hope from Positive Future, Negative Future, and Negative Past be assessed. Examination of the correlation table indicated

that the intercorrelation between Hope and both Negative Future and Negative Past was weak (<.20). However, the relationship between Hope and Positive Future suggested a slightly stronger relationship (.254), and given what is known about the two constructs there was concern that this correlation indicated the possibility of significant overlap in contribution to the variance ($\boldsymbol{R^2}$). Therefore, to ensure the multiple linear regression assumptions for Model 2 are met the variables were examined.

In reviewing the coefficients, Positive Future was a significant predictor when predicting depression without any other predictor variables (p<0.01), but when Hope (p<.0001) was added Positive Future ceases to be significant. Furthermore, the zero-order correlations along with the considerable change in $\boldsymbol{R^2}$ and much stronger negative correlation of Hope and Depression suggest that the assumption that Hope shares all or most of Positive Future's predictive power is reasonable. Considering this information, the independence of the two variables is called into question and makes interpretation of the coefficients difficult.

Even though there was significant overlap between Positive Future and Hope, there were other limitations of the study that had effects on the data that is currently unknown and makes the ultimate determination of independence of Depression and Hope inconclusive. Therefore, the results for all six models will be reported and the considerable limitations will be discussed in Chapter 5 in the study limitations subsection.

Assumptions Analysis

To examine the assumptions of regression analysis (Homoscedasticity, Normally Distributed Errors, lack of auto-correlation, lack of multi-collinearity, and Independence of Predictor Variables (Chatterjee & Simonoff, 2013)) several plots for each pair of models were analyzed. These plots include a plot of the residuals versus predicted values for each of the

research question models. Visual analysis was used to determine if a notable relationship may exist, as one should not to satisfy the assumption of homoscedasticity. The normal P-P plot of the residuals is presented which should resemble a straight line to indicate that the errors are normally distributed. The histogram distribution of the standardized residuals was also used to confirm that the standardized residuals are approximately normally distributed. Finally scatter plots of the unstandardized residuals and each predictor variable were visually examined to ensure that there is no relationship between the residuals and the actual values to confirm the assumption of independence of predictors. Concerns of Multi-Collinearity are assessed by examining the Variance Inflation Factors (VIF) based on the general guideline of a VIF of less than 10 as presented by Chatterjee and Simonoff (2013). Additionally, as the data were collected at a single point in time and only once from each participant there should not be any concerns of auto-correlation.

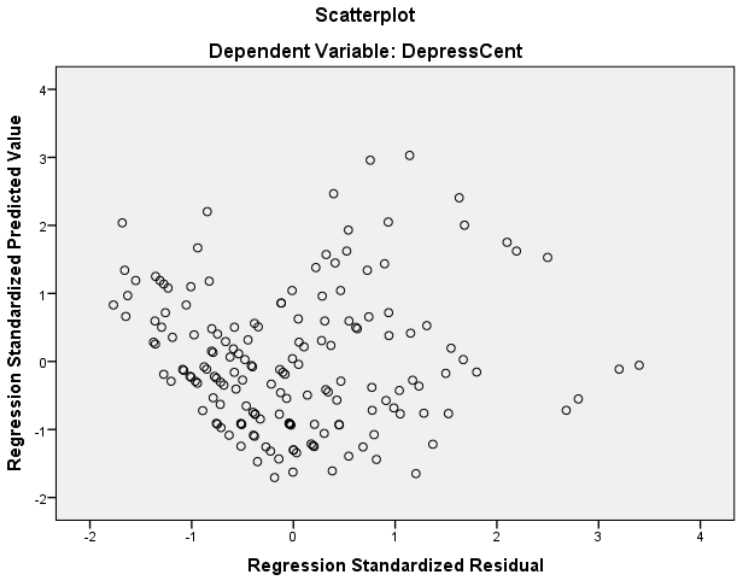

Figure 4-1, Plot of residual versus predicted values for models 1 and 2

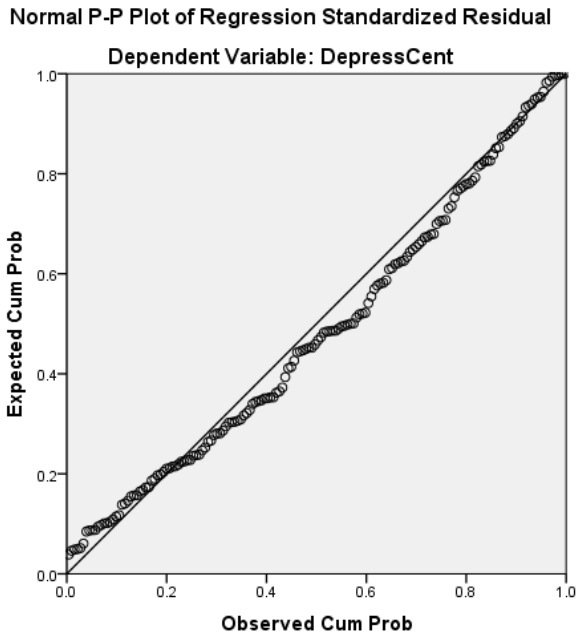

Figure 4-2, Normal Probability Plot of the Standardized Residuals for models 1 and 2

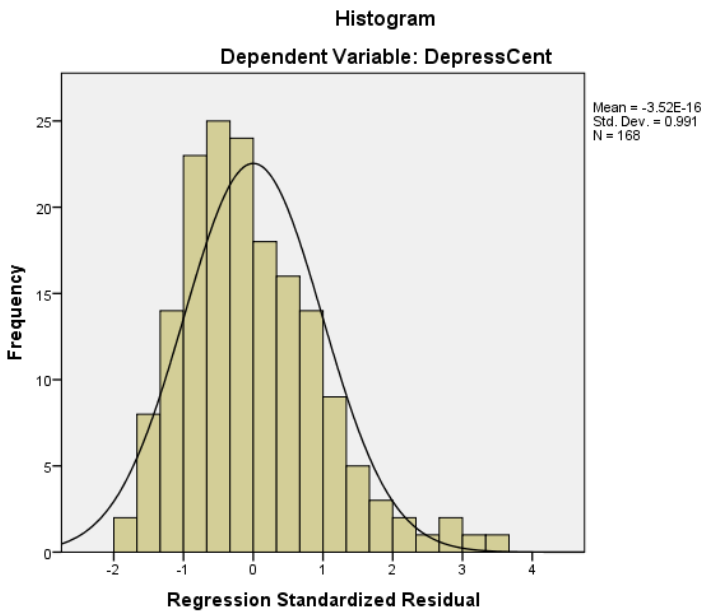

Figure 4-3, Distribution of standardized residuals in Models 1 and 2

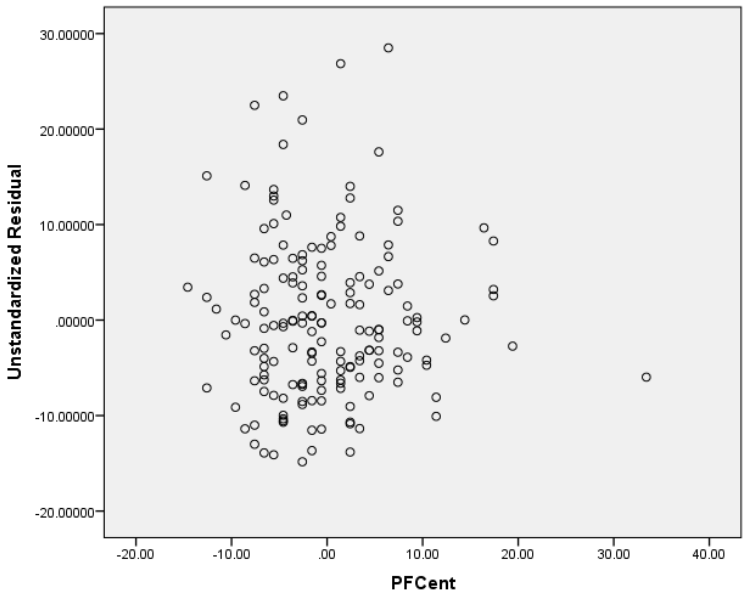

Figure 4-4, Plot of unstandardized residuals and PFC in Models 1 and 2

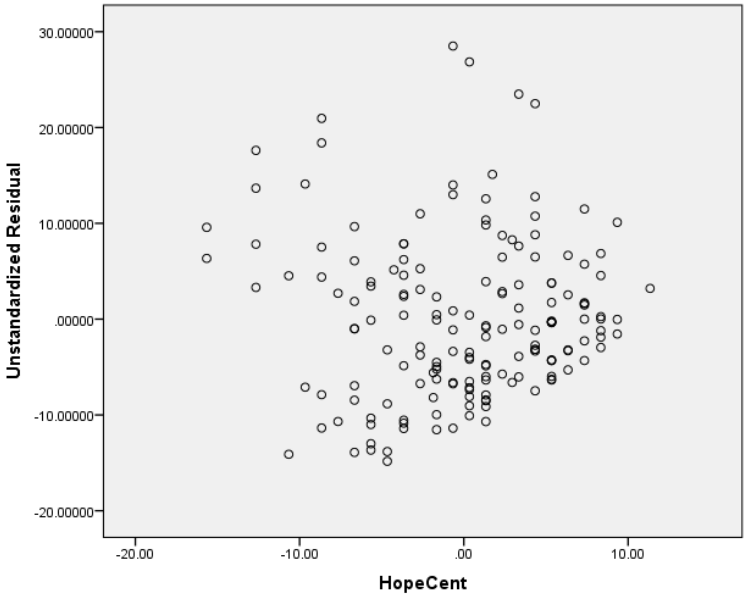

Figure 4-5, Plot of unstandardized residuals and Hope in Models 1 and 2

In assessing the assumptions of models 1 and 2, Figure 4-1 indicates that models 1 and 2 show some clustering toward the lower end of the data but generally there does not appear to be any strong relationship, this confirms homoscedasticity. Examining figure 4-2 and 4-3 it appears that the plot of the standardized residuals resembles a straight line and the histogram resembles a normal distribution confirming the assumption of normally distributed errors, however some

slight positive skew is present and should be considered. Examining the scatter plots of the unstandardized residuals with both PFC and Hope indicates that the assumption of independence appears to be confirmed (see Figures 4-4 and 4-5) as no obvious relationship exists. Multicollinearity in model 2 appears minimal as indicated by the intercorrelations presented in table 4-1, and the Variance Inflation Factor for both variables is below the general guideline confirming a lack of multi-collinearity (PFC VIF=1.195, Hope VIF=1.118). As presumed, examination of the Durbin-Watson statistic for model 2 (1.972) indicates that there does not seem to be any autocorrelation concerns.

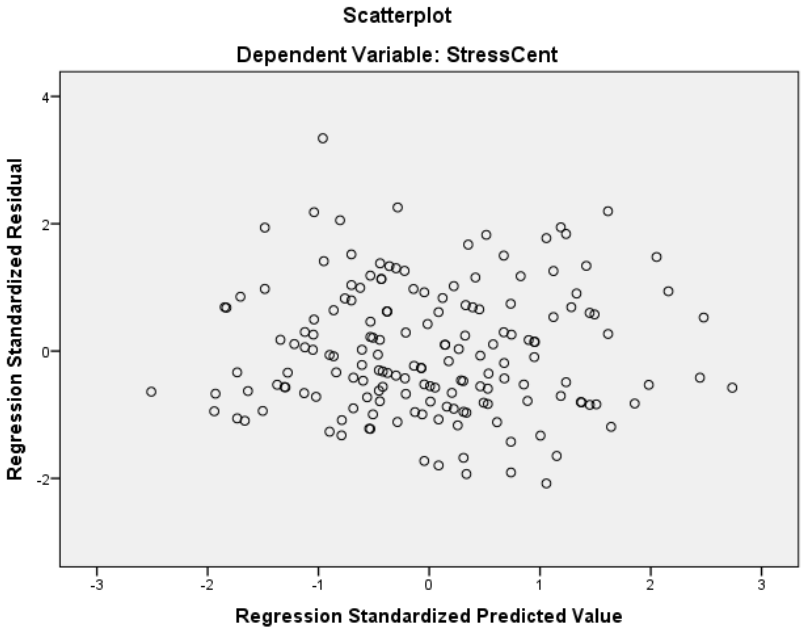

Figure 4-6, Plot of residual versus predicted values for models 3 and 4

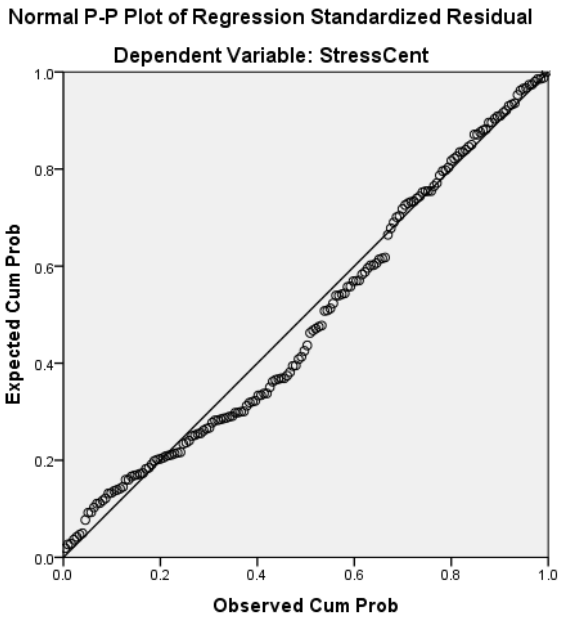

Figure 4-7, Normal probability plot of the standardized residuals for models 3 and 4

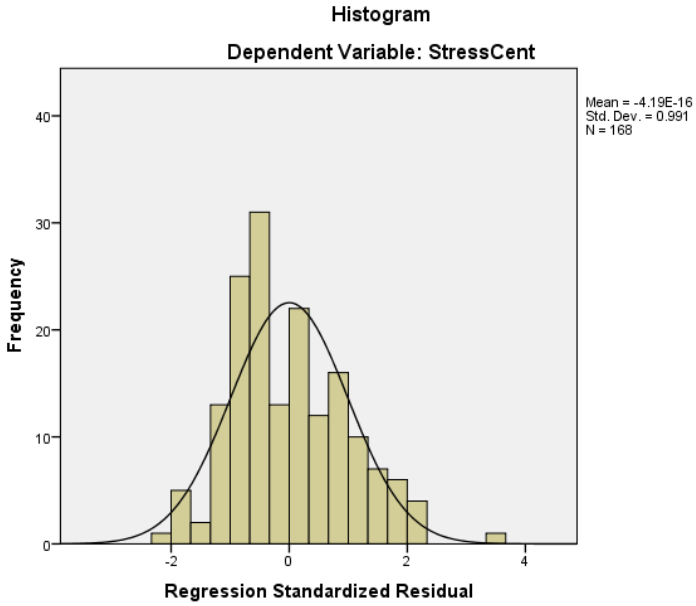

Figure 4-8, Distribution of standardized residuals in Models 3 and 4

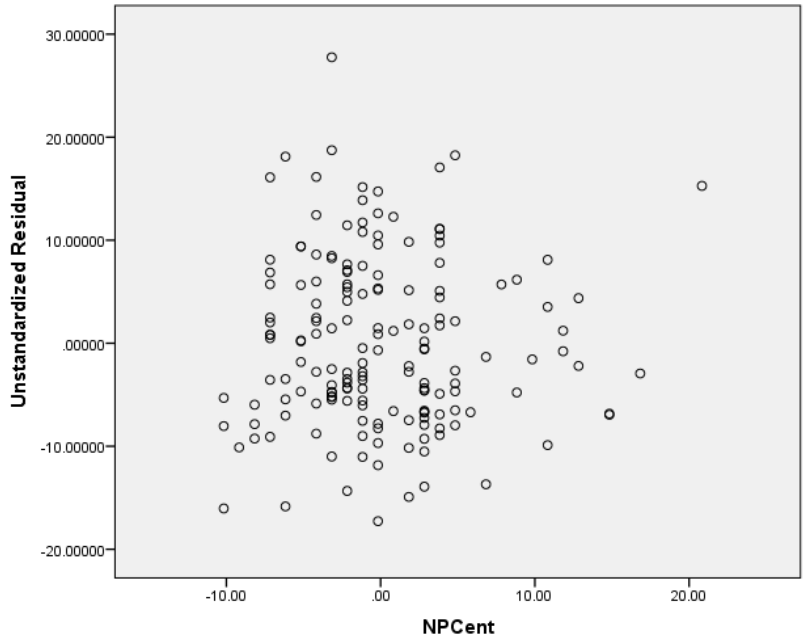

Figure 4-9, Plot of unstandardized residuals and NPC in Models 3 and 4

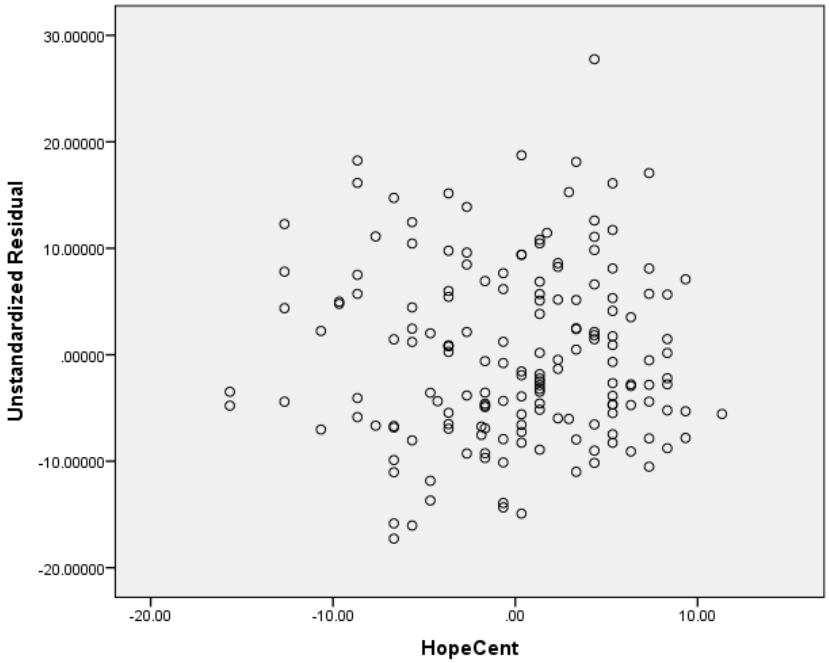

Figure 4-10, Plot of unstandardized residuals and Hope in Models 3 and 4

In assessing the assumptions of models 3 and 4, Figure 4-6 indicates that models 3 and 4 show no strong relationship, this confirms homoscedasticity. Examining figure 4-7 and 4-8 it appears that the plot of the standardized residuals resembles a straight line and the histogram

resembles a normal distribution confirming the assumption of normally distributed errors, however again there might be some slight positive skew and this should be considered. Examining the scatter plots of the unstandardized residuals with both NPC and Hope indicate that the assumption of independence appears to be confirmed (see Figures 4-9 and 4-10) as no obvious relationships exists. Multicollinearity in model 4 appears minimal as indicated by the intercorrelations presented in table 4-1, and the Variance Inflation Factor for both variables is below the general guideline confirming a lack of multi-collinearity (NPC VIF=1.002, Hope VIF=1.007). As presumed, examination of the Durbin-Watson statistic for model 4 (2.159) indicates that there does not seem to be any autocorrelation concerns.

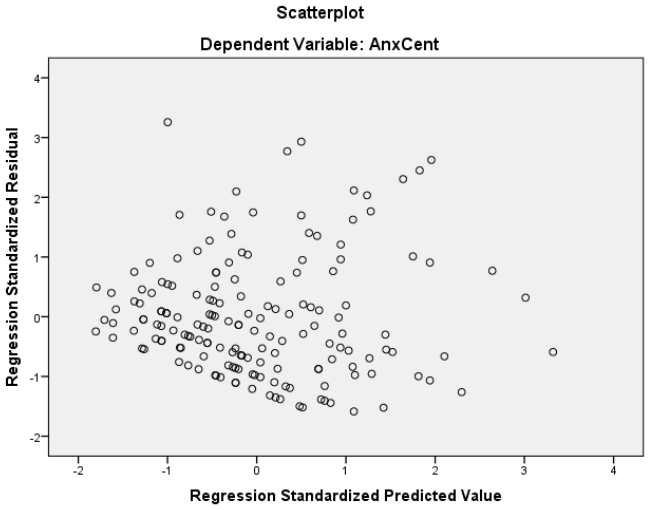

Figure 4-11, Plot of residual versus predicted values for models 5 and 6

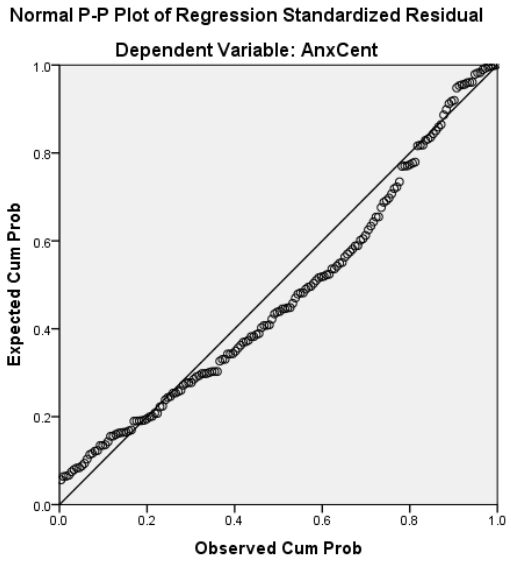

Figure 4-12, Normal probability plot of the standardized residuals for models 5 and 6

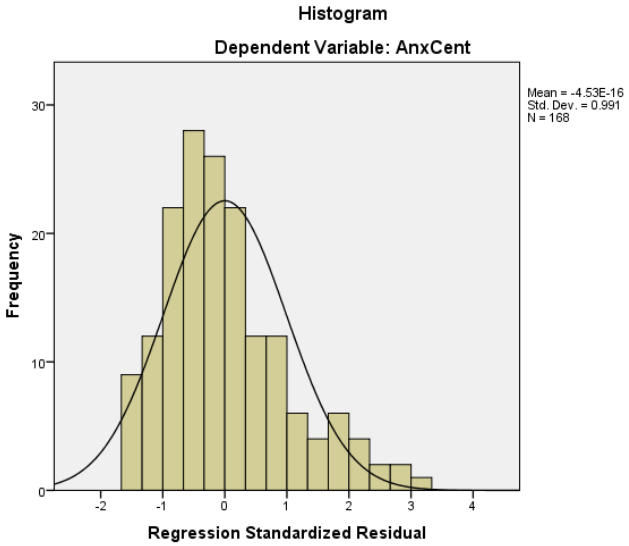

Figure 4-13, Distribution of standardized residuals in Models 5 and 6

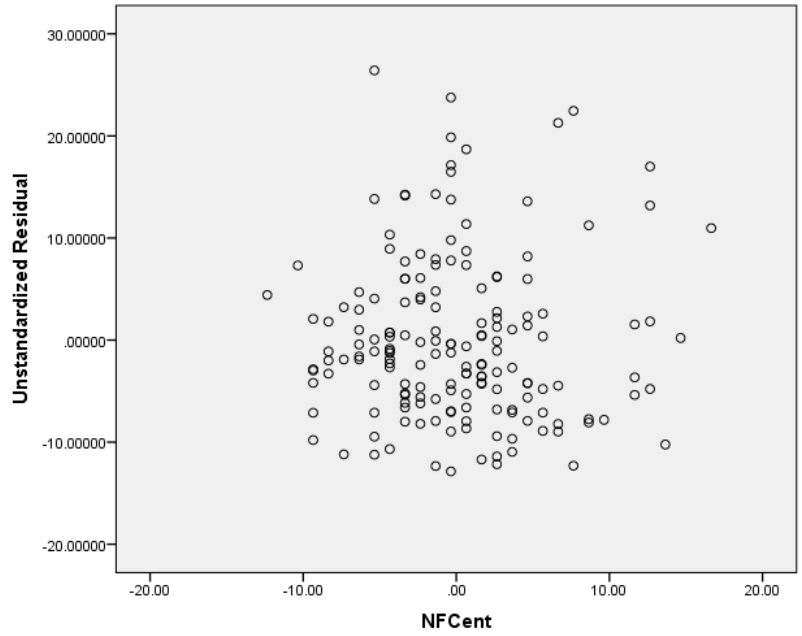

Figure 4-14, Plot of unstandardized residuals and NFC in Models 5 and 6

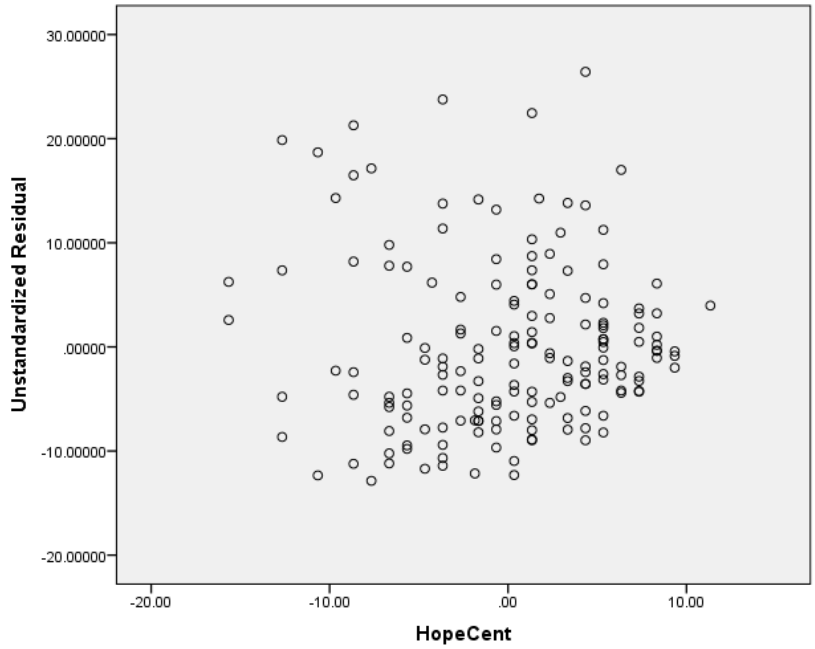

Figure 4-15, Plot of unstandardized residuals and Hope in Models 5 and 6

In assessing the assumptions of models 5 and 6, Figure 4-11 indicates that models 5 and 6 show some clustering on the lower end of the plot, but no strong relationship appears to exist and this likely confirms homoscedasticity. Examining figure 4-12 and 4-13 it appears that the plot of the standardized residuals has some positive skew but generally resembles a straight line and the

histogram resembles a generally normal distribution confirming the assumption of normally distributed errors. Examining the scatter plots of the unstandardized residuals with both NFC and Hope indicate that the assumption of independence appears to be confirmed (see Figures 4-14 and 4-15) as no obvious relationships exists. Multicollinearity in model 4 appears minimal as indicated by the inter-correlations presented in table 4-1, and the Variance Inflation Factor for both variables is below the general guideline confirming a lack of multi-collinearity (NFC VIF=1.041, Hope VIF=1.038). As presumed, examination of the Durbin-Watson statistic for model 6 (1.793) indicates that there does not seem to be any autocorrelation concerns.

Regression Results

The planned regression analyses were conducted to answer each of the three research questions. The first and primary research question of the study involved the contribution of the number of Positive Future cognitions produced by a participant on their self-reported Depression as measured by the DASS 21, over and above the effect of Hope. The second question involved the contribution of the number of Negative Past cognitions produced by a participant on their self-reported Stress as measured by the DASS 21, over and above the effect of Hope. The third involved the contribution of the number of Negative Future cognitions produced by a participant on their self-reported Anxiety as measured by the DASS 21, over and above the effect of Hope. The results of the regression analyses conducted are presented in the following sections.

Hierarchical Regression Analysis

It was necessary to conduct a hierarchical regression analysis to examine the predictive power of each of the predictor variables over and above Hope on their respective dependent variables. The first set of models (models 1 & 2), as discussed above, involved the prediction of

Depression from Positive Future cognition over and above Hope. The first model in the set determined the relative prediction of Depression attributed to just Positive Future cognition while the second model included Hope as an additional variable to examine if an already established construct (Snyder, 2002) might otherwise explain some or all of the same variance in Depression. The two models were entered into the regression analysis using the ENTER function in SPSS and the results are presented in Table 4-3.

Table 4-3

Prediction of Depression by Positive Future Cognition in Students Age 14-19 (Models 1 & 2)

	Depression			
	Model 1	Model 2		
Variable	*B*	*B*	95% CI	Zero-Order Correlation
Constant	.002	-.191	[-1.511 to 1.129]	
Positive Future	-.288	-.113	[-.315 to .089]	-.195
Hope		-1.002	[-1.242 to -.762]	-.580
Interaction		.019	[-.014 to .053]	.124
R^2	.038	.344		
ΔR^2		.306		

*I < .001.

The model containing only Positive Future cognition predicts approximately 3.8% of the variance in Depression while the model containing both Positive Future cognition and Hope predicts approximately 34.4% of the variance in Depression. This demonstrates an improvement in model 2 of 30.6% (R^2 change = .306). The model containing only Positive Future Cognition adds to the prediction of Depression with a statistical significance over the model with no predictors (F=6.54, p<.02); however the second model, when Hope and the interaction are

added, also contributes a considerable amount to the prediction of Depression with statistical significance over the model with no predictors (F=28.73, p<.001), however in this model the coefficient of Positive Future cognition is no longer significant (B = -.113, p=.271) and Hope demonstrates significance (B=-1.002, p<.001). This calls into question whether or not the majority if not all of the variance explained by Positive Future cognition could otherwise just be explained by Hope alone.

The second set of models (models 3 & 4), as discussed above, involved the prediction of Stress from Negative Past cognition over and above Hope. Model 3 determined the relative prediction of Stress attributed to just Negative Past cognition, while model 4 included Hope as an additional variable to examine if an already established construct (Snyder, 2002) might otherwise explain some or all of the same variance in Stress. The two models were entered into the regression analysis using the ENTER function in SPSS and the results are presented in Table 4-4.

Table 4-4

Prediction of Stress by Negative Past Cognition in Students Age 14-19 (Models 3 & 4)

	Stress			
	Model 3	Model 4		
Variable	*B*	*B*	95% CI	Zero-Order Correlation
Constant	-.001	.015	[-1.251 to 1.281]	
Negative Past	.357	.326	[.095 to .558]	.210
Hope		-.714	[-.939 to -.488]	-.435
Interaction		.013	[-.026 to .053]	.017
R^2	.044	.228		
ΔR^2		.184		

*I < .001.

The model containing only Negative Past cognition predicts approximately 4.4% of the variance in Stress, while the model containing both Negative Past cognition and Hope predicts approximately 22.8% of the variance in Stress. This demonstrates an improvement in model 4 of 18.4% (R^2 change = .184). The model containing only Negative Past cognition adds to the prediction of Stress with a statistical significance over the model with no predictors (F=7.64, p<.01). However, the second model, when Hope and the interaction are added, also contributes significantly to the prediction of Stress over the model with no predictors (F=16.168, p<.001), and although Hope is a significant predictor (B=-.714, p<.001) and there is a considerable drop in the coefficient assigned to Negative Past cognition, Negative Past cognition remains a significant predictor (B=.326, p=.006).

The third set of models (models 5 & 6), as discussed above, involved the prediction of Anxiety from Negative Future cognition over and above Hope. Model 5 determined the relative prediction of Anxiety attributed to just Negative Future cognition, while model 6 included Hope as an additional variable to examine if an already established construct (Snyder, 2002) might otherwise explain some or all of the same variance in Anxiety. The two models were entered into the regression analysis using the ENTER function in SPSS and the results are presented in Table 4-5.

Table 4-5

Prediction of Anxiety by Negative Future Cognition in Students Age 14-19 (Models 5 & 6)

	Anxiety			
	Model 5	Model 6		
Variable	*B*	*B*	95% CI	Zero-Order Correlation
Constant	-.001	-.062	[-1.311 to 1.187]	

Negative Future	.429	.341	[.111 to .570]	.258
Hope		-.660	[-.884 to -.437]	-.440
Interaction		-.013	[-.054 to .027]	-.063
R^2	.066	.234		
ΔR^2		.168		

*I < .001.

The model containing only Negative Future cognition predicts approximately 6.6% of the variance in Anxiety, while the model containing both Negative Future cognition and Hope predicts approximately 23.4% of the variance in Anxiety. This demonstrates an improvement in model 6 of 16.8% (R^2 change = .168). The model containing only Negative Future cognition adds to the prediction of anxiety with a statistical significance over the model with no predictors (F=11.805, p=.001). However, the second model, when Hope and the interaction are added, also contributes significantly to the prediction of Anxiety over the model with no predictors (F=16.734, p<.001), and although Hope is a significant predictor (B=-.660, p<.001) and there is a drop in the coefficient assigned to Negative Future cognition, Negative Future cognition remains a significant predictor (B=.341, p=.004).

Examining the Regression Coefficients for Predictive Power

Aside from simply assessing if the independent variables of interest are significant predictors of their respective dependent variables, it is important to consider what their predictive power is after adding the already established construct of Hope (Snyder, 2002) to the equation. In all cases presented above when Hope was introduced it had a significant predictive power on each dependent variable and the overall contribution of the independent variables of interest appeared to be reduced.

When examining the results of the regression equation that examined the combined predictive power of Positive Future cognition and Hope on Depression, Hope had a highly significant effect when predicting Depression and Positive Future cognition had a very weak effect and ceased to be a significant predictor. Upon examining Table 4-2 it is clear that 0 falls within the 95% confidence interval for Positive Future cognition in Model 2, thus signifying that there ultimately may not be a relationship between Positive Future cognition and Depression beyond that which is predicted by Hope as was hypothesized. Additionally, in this analysis the interaction between Positive Future cognition and Hope is not significant as the 95% confidence interval includes 0, this should be considered when interpreting the main effects.

When examining the result of the regression equation that examined the combined predictive power of Negative Past cognition and Hope on Stress, Hope had a significant effect when predicting Stress and Negative Past cognition had a weaker effect when predicting Stress but its effect remained significant. Upon examining Table 4-3 it should be noted that 0 does not fall within the 95% confidence interval for either Hope or Negative Past cognition in model 4, thus signifying that even when Hope is introduced as a predictor variable Negative Past cognition may still provide at least some unique contribution to the variance in Stress. Additionally, the interaction between Negative Past cognition and Hope is not significant as the 95% confidence interval includes 0, this should be considered when interpreting the main effects.

When examining the result of the regression equation that examined the combined predictive power of Negative Future cognition and Hope on Anxiety, Hope had a highly significant effect when predicting Anxiety and Negative Future cognition had a weaker effect when predicting Anxiety but its effect also remained significant. Upon examining Table 4-4 it should be noted that 0 does not fall within the 95% confidence interval for either Hope or

Negative Future cognition in model 6, thus signifying that even when Hope is introduced as a predictor variable Negative Future cognition may still provide some unique contribution to the variance in Anxiety. Additionally, the interaction between Negative Future cognition and Hope is not significant as the 95% confidence interval includes 0, this should be considered when interpreting the main effects.

Given that in models 2, 4, and 6 examined above the interaction term is never statistically significant, the analysis was run again for each hypothesis excluding the interaction terms. The results for these additional analyses are presented in the tables below.

Table 4-6

Prediction of Depression by Positive Future Cognition in Students Age 14-19 excluding the interaction term. (Model 7)

	Depression		
	Model 7		
Variable	*B*	95% CI	Zero-Order Correlation
Constant	.001	[-1.278 to 1.280]	
Positive Future	-.075	[-.266 to .116]	-.195
Hope	-1.031	[-1.266 to -.797]	-.580
R^2	.339		

*I < .001.

Upon inspecting the model 7 (Table 4-6), a model excluding the interaction term from model 2, the *B* values and confidence intervals remain the same, however there is a decrease in the overall R^2 by .005. The coefficient of Positive Future remains statistically insignificant, and Hope appears to still contribute the vast majority of the variance in depression, likely including the variance of PFC.

Table 4-7

Prediction of Stress by Negative Past Cognition in Students Age 14-19 excluding the interaction term. (Model 8)

Stress			
	Model 8		
Variable	*B*	95% CI	Zero-Order Correlation
Constant	-.002	[-1.265 to 1.261]	
Negative Past	.327	[.096 to .558]	.210
Hope	-.709	[-.933 to -.484]	-.435
R^2	.226		

*I < .001.

Upon inspecting model 8 (Table 4-7), a model excluding the interaction term from model 4, the *B* values for the Constant, Negative Past, and Hope, have changed by -.013, -,001, and -.005 respectively. The confidence intervals for each variable remain the same, and there is a decrease in the overall R^2 by -.002. Both Negative Past and Hope remained significant predictors of stress.

Table 4-8

Prediction of Anxiety by Negative Future Cognition in Students Age 14-19 excluding the interaction term. (Model 9)

Anxiety			
	Model 9		
Variable	*B*	95% CI	Zero-Order Correlation
Constant	-.002	[-1.235 to 1.231]	
Negative Future	.330	[.103 to .557]	.258
Hope	-.669	[-.891 to -.448]	-.440
R^2	.232		

*I < .001.

Upon inspecting model 9 (Table 4-8), a model excluding the interaction term from model 6, the *B* values for the Constant, Negative Future, and Hope, have changed by .060, -,011, and -.009 respectively. The confidence intervals for each variable remain the same, and there is a

decrease in the overall R^2 by -.002. Both Negative Future and Hope remained significant predictors of anxiety.

Additionally, the standardized coefficients for each variable considered in models 7, 8, and 9 were computed and are presented in the table below (Table 4-9).

Table 4-9

Descriptive Statistics for the 8 Dependent Variables

	Standardized Coefficients
Model 7 (Depression)	
Positive Future	-.051
Hope	-.568
Model 8 (Stress)	
Negative Past	.192
Hope	-.427
Model 9 (Anxiety)	
Negative Future	.198
Hope	-.412

Summary

The regression analyses presented above indicated that the assumptions to conduct multiple regression were generally met for each of the models being examined. Additionally, for each independent variable inter-correlation was assessed via the correlation matrix. Only Positive Future cognition and Hope appeared to be highly correlated to the degree that there was concern, and thus their independence was called into question, however the other independent variables (Negative Past & Negative Future) had a correlation with hope of less than |.2| and thus were not directly examined.

The results of the regression analysis of models 1 and 2 indicated that Hope and Positive Future cognition did not appear to have mutually exclusive contributions to the variance of Depression. This is consistent with the concern that the two variables did not satisfy the

assumption of independence. The regression analysis of models 3 and 4 indicated that Hope and Negative Past cognition appeared to have some mutually exclusive contribution to the variance of Stress, however the contribution of Hope was considerably stronger and accounted for a much larger portion of the variance relative to that of Negative Past cognition. The results of the regression analysis of models 5 and 6 indicated that Hope and Negative Future cognition appeared to have some exclusive contributions to the variance of Anxiety, although Hope accounted for a much larger portion of the variance relative to that of Negative Future cognition.

In addition to the general analyses proposed by the hypotheses of the study, and given that in all cases the interaction terms were not statistically significant, further models were examined (models 7, 8, and 9) which replicated models 2, 4, and 6 with the exclusion of the interaction terms. In model 7 none of the B values nor the confidence intervals changed, however in models 8 and 9 there were differences in the B values. In all cases there were changes in the R^2 values. The standardized coefficients for each independent variable in models 7, 8, and 9 were also displayed in a table for review.

The next chapter will examine the implications of these results as well as review the limitations of this study, how those limitations may have influenced the outcomes, and suggest a direction for future research in this domain.

CHAPTER 5

DISCUSSION, IMPLICATIONS, AND LIMITATIONS

The best practice role of a school psychologist has been described in the contemporary literature as a scientist-practitioner, someone who not only delivers services to young people but also actively participates in the act of scientific learning in a controlled, logical, and empirical fashion. Thus, all service delivery should arise from a thoughtful examination of the options available to the practitioner and a careful consideration of new options when they are made available. One goal of this study was to provide evidence which would allow for the extension of a promising adult theory of affect and cognition to the adolescent population, affording school psychologists the potential opportunity to explore new treatment approaches with their students. This chapter provides a rationale for this investigation as well as a discussion of the findings, limitations, and suggestions for further research going forward.

Rationale for this Investigation

Mental health is a key predictor of success in many aspects of life. Given the school psychologists' proximity to adolescents as they make their way through life via school there are ample opportunities to provide both effective short-term treatment and apply preventive strategies in the school setting to improve overall mental health for all students. However, it is important to determine what the best strategies and methods of service delivery are with a given population and to consider new and potentially more effective methods if they arise.

Strategies such as cognitive behavioral therapy and interpersonal therapy are well known and effective strategies for many emotional concerns experienced by students. Thus, having an eclectic repertoire of approaches is important as it will afford the practitioner a broader variety of tools and methods to provide to adolescents who may not be as successful with traditional

approaches. Presently many of these approaches are derived from the cognitive therapy model established in the mid-20th century (Ellis, 1957), and thus further development of these methods should be closely related to further development of the cognitive theory that supports it.

Depression is a common and often challenging to treat concern in children and adolescents. Presently the cognitive treatments utilized to treat depression tend to concentrate on adjustment of present thinking, with the hope that this thinking will transfer effectively into thinking about the future. However, given the relationship between hopelessness, a future oriented construct, and depression, perhaps the focus should concentrate more on future thinking. Additionally, most cognitive treatment concentrates on adjusting or reducing negative thoughts, yet emerging research suggest that excess negative thoughts may not be the root cause of depressive symptoms and that simply a lack of positive beliefs about the future may be a better predictor of risk for depression.

A more contemporary cognitive theory as it applies to affect proposed by Andrew MacLeod and a number of his colleagues in the late 20th and into the early 21st century (MacLeod & Byrne, 1996; Macleod, Byrne, & Valentine, 1996; Macleod, Tata, Kentish, & Jacobsen, 1997; Macleod & Salaminiou, 2001; Miles, Macloed, & Pote, 2004; Macleod & Conway, 2007; Stober, 2000) offers a different way of looking at how cognition and affect interact and how this interaction may predict mental health concerns. Primarily it asserts that focusing on the generation of positive future thinking in people should produce greater resilience against many symptoms of mental illness, especially those related to depression. However, only one study among those cited above examined how this theory applies to an adolescent population (Miles, MacLeod, & Pote, 2004).

At this time few treatment methods are built upon the theory proposed by MacLeod and colleagues. However, recently Vilhauer et al. (2011) developed and piloted a form of psychotherapy which is closely aligned known as "Future Directed Therapy (FDT) ™". Their sample included 16 outpatients (aged 27-73) diagnosed with major depressive disorder, who participated in 20, 90-minute, group therapy sessions over the course of 10 weeks. Their treatment procedures were based heavily on the principle that boosting positive expectations about the future, versus attempting to remedy present negative beliefs and/or only focusing on coping skills, would result in significant reductions in depressive symptoms.

Given the significant treatment results ($p<.001$), there was reason to believe that FDT may more effectively reduce depression symptoms, when compared to a contemporary treatment. Further data analysis revealed higher effect sizes than are commonly found in treatment comparison studies (.71), thus the benefits of FDT may be considerable with regard to the choice of clinical treatment modality for depressed clients. Ultimately lending credence to the proposal that focusing not only on remedying present negative cognition, but on facilitating future positive cognition as well, is critical in producing the most successful treatment outcomes. Even though Vilhauer et al.'s (2011) intervention was designed and tested on adult clients, it is still likely that many of the core tenets of this treatment procedure may prove useful in other contexts and with other client samples.

Vilhauer et al.'s (2011) study focused exclusively on adult depression with outpatients; however, the results provide justification for exploring this treatment method with other outpatient populations such as adolescents. It may also prove useful to clinicians who already implement similar cognitive interventions with adolescents, such as school mental health staff and their affiliates.

This study aimed to replicate the findings of Miles, MacLeod, & Pote (2004) to ultimately set the foundation for the potential development of a future oriented therapeutic method for adolescents similar to that of Vilhauer et al. (2011). The findings alone will not necessarily validate the theory entirely, but it will shed light on the potential validity with an adolescent population. Going forward these findings should inform future exploration and application of a new contemporary cognitive theory and may support the development of new and more beneficial psychotherapy for depression.

Discussion of Results

The following section will provide details regarding how the results of this study may contribute to both present and future research. It will specifically examine the primary research question regarding Positive Future expectation and its ability to predict depression, as well as two other prediction models regarding anxiety and stress and their relationship to Negative Future cognitions and Negative Past cognitions respectively. Additionally, each independent variable will be examined regarding its ability to predict the corresponding dependent variable in each of the aforementioned models. Finally, the implications for future research, the limitations of the present study, and suggestions for future research will be discussed in detail.

Study Models

This study initially examined the model that represented the primary research question, what is the predictive power of Positive Future cognition on the self-report of depression symptoms. This model is a replication of that used by Miles, MacLeod, and Pote (2004), however in addition it adds the construct of Hope as defined by Snyder (2002) as an additional variable as per the suggestion of the authors in the previous study. An individual's hopeful disposition may account for a profound amount of the variance in depression, and it was

proposed that it may already encompass Positive Future cognition making a measure of hope a more sensitive measure than Positive Future cognition alone.

The results of the primary regression analysis indicate that measurement of Positive Future cognition may only account for a small portion of the variance in depression symptoms, and that dispositional Hope may in fact account for a much larger portion of the variance in the prediction of depression symptoms. Additionally, Hope may also account for most if not all of that variance in depression that is also accounted for by Positive Future cognition, thus making Hope the most efficient and likely preferable measure of this construct. More about this will be discussed below.

The other models of interest also indicated meaningful implications. The model examining the predictive power of Negative Past cognition on stress suggests that even though negative past cognition remains a significant predictor of stress after hope is included in the model, hope still accounts for a significantly larger portion of the variance in stress symptoms. Likewise, the model which examined the predictive power of negative future cognition on anxiety had a similar outcome where negative future cognition remained significant even after the addition of hope to the model, but hope again was a much larger contributor to the prediction of anxiety symptoms.

Regression Coefficients

A regression coefficient represents the number of units of change in a dependent variable per unit change in a given independent variable (Cohen, Cohen, West, & Aiken, 2003). The significance of a regression coefficient indicates whether or not these variables are significant predictors of the associated dependent variable, over and above that of other predictors that may be introduced, and thus the predicted change in the dependent variable that is accounted for by a

given change in the independent variable is a consistent non-random effect and can be interpreted with confidence.

The regression coefficients in the present study offer insight into their predictive power of positive future cognition, negative past cognition, and negative future cognition on their associated dependent variables over and above that which can be predicted by dispositional hope as defined by Snyder (2002). Given the sample size of this study and some of the confounding factors that will be discussed below in the limitations section, these coefficients should be interpreted with caution as their overall importance in providing meaningful information for the application of the proposed theory with adolescents is limited.

Positive future cognition. The results of the regression analysis for models 1 and 2 indicate that even though while interpreted alone positive future cognition is a significant predictor of depression symptoms, when examined in tandem with dispositional hope, hope is a significant predictor while positive future cognition ceases to be. When examining the correlation between positive future cognition and hope (r=.254) it might not be surprising that there is a moderate relationship between the two given the similarity of the constructs. Yet when the $\boldsymbol{r^2}$ values are examined positive future cognition provides an explanation for only 3.8% of the variance while it appears hope contributes over 30%, so regardless of the confidence of the coefficients, hope appears to provide a considerably higher proportion of the variance in depression symptoms and possibly overlapping enough of positive future cognition to the point where hope may be a better predictor overall. That being said there were considerable limitations with the measure used to assess positive future cognition which may have skewed the overall measurement of the construct and subsequently its relationship with depression symptoms.

Negative past cognition. The results of the regression analysis for models 3 and 4 indicated that when interpreted alone negative past cognition was a significant predictor of stress, even when hope is introduced into the equation in model 4. However, given that negative past cognition only provided 4.4% of the variance in stress symptoms and hope appears to contribute 18.4%, hope again is a relatively stronger predictor of stress symptoms as it was with depression. As with models 1 and 2, the results for models 3 and 4 may not represent the true predictive power of negative past cognition on stress symptoms as there were many limitations and confounding factors in the measurement of this construct.

Negative Future Cognition. The results of the regression analysis for models 5 and 6 indicated that when interpreted alone negative future cognition was a significant predictor of anxiety, even when hope is introduced into the equation in model 6. Once again the results of the regression analysis indicate that negative future cognition as an independent variable can account for approximately 6.6% of the variance in anxiety symptoms, but hope appears to contribute 16.8% and remains a relatively stronger predictor of anxiety symptoms, as it was with depression and stress. However, in the case of anxiety symptoms negative future cognition did not suffer the same degree of drop in its coefficient that positive future cognition and negative past cognition did.

Implications

The primary findings of this study indicate that while positive future expectations as measured by the Memory and Future Thinking Task (MacLeod et al., 1997) is by itself a meaningful albeit minor predictor of depression symptoms in the study sample, when dispositional hope is introduced into the equation the overall contribution of positive future expectation is reduced and it ceases to be significant. Ultimately, this indicates doubt that it is a

meaningful predictor at all. It is possible that hope as measured by the Children's Hope Scale (Snyder, 1997) is likely just a better construct to use as a predictor.

Beyond the primary findings, the two secondary models indicated that both negative past cognition and negative future cognition were able to significantly predict small portions of the variance in stress and anxiety respectively, but that overall their contributions were weak. Additionally, the addition of hope to both sets of models resulted in reduction of the relative contribution from the independent variables of interest and itself contributed a significantly greater proportion of the variance in the respective dependent variables.

Ultimately, while none of the independent variables derived from the Memory and Future Thinking Task provided the hypothesized robust contribution to their respective dependent variables, the administration of the measure and the measure itself were flawed in several ways. It is important to recognize that there were considerable limitations in this study given the ways and means of the study and the population of participants who opted to contribute data. The next section will go into greater detail regarding these limitations and suggestion potential solutions.

Limitations

The limitations provided in this section should be strongly considered when interpreting the results of this study. The primary concerns to be discussed below are significant limitations in the use of the primary independent variable task, the Memory and Future Thinking Task (MacLeod et al., 1997), the power that this study sample size had to statistically detect any small effects present, and finally the representativeness of the study sample given the sample demographics versus the population of interest in the primary research question. Other concerns regarding some of the measures used and recruitment techniques will also be discussed.

Limitations of the Memory and Future Thinking Task

The Memory and Future Thinking task was the primary method of assessing the values for the primary independent variables in this study. However, the method of data collection for this measure was problematic in several ways. These ways include the format of administration, the observation and control of administration, technical errors in the online format, screening of participants' cognitive skills, length of responses limiting the overall total responses recorded, as well as others that will be discussed below.

The first was that in this study the decision was made to use two separate methods of administration for this task depending upon the setting in which it was being used. In the high school setting it was administered in person where timing and responses could be observed and better controlled, and in the university setting the task was administered using an online survey tool where the timing and responses were automated and left at the discretion of the participant. The vast majority of the participants in this study were recruited from the university setting (141) as there were few (18) individuals who responded to the high school level recruitment materials.

The original form of the Memory and future thinking task was administered as an interview where the experimenters spoke with each participant one on one and recorded their responses. Future iterations of the task used hand written group administrations similar to that used in the high school form of this study, those versions were equally successful. This study to the best understanding of the experimenter was the first to use an internet based automated method of administration for this task. Given that each online administration was performed independently by the participant there is no way to know how environmental factors contributed to responses as well as other personal factors unique to each participant and the setting in which they completed the task (e.g. library, dorm room, busy coffee shop, etc.). Initially it was planned

that both forms of administration would have an equal contribution to the overall participant pool, however given the low response rate at the high school level this was not possible.

It is also impossible to know how technical errors contributed to the responses of participants as there are no data recorded by the website utilized that details crashes, errors, or technical problems on the participant's end (e.g. personal computer crash, error, power outage, or and other technical failure). Along the same lines the personal hardware used by participants may have contributed to responses as well, depending upon the size of the keyboard, type of computer (e.g. laptop, PC, tablet, etc.). All of this information is unavailable and was not possible to collect at the time of the study administration.

Additionally, after analyzing the data there appeared to be a disruptive effect that was present in the data interfering with interpreting participants' performance on the tasks. One hypothesis is that this effect is related to the participants' written skills, verbal language skills, vocabulary, or processing speed. The word writing control task was examined to better understand if it had to do with verbal skills or diversity of vocabulary, however the data were inconclusive and the word writing task did not provide much information. These cognitive constructs were not assessed prior to, during, or after administration so there is no way to be confident that each participant had an equal ability or opportunity to respond to the prompts provided in the memory and future thinking tasks administered online. Significant deficits in cognitive ability or cognitive impairment as a result of injury such as a concussion may have had considerable effects on individual participant performance as well, but are ultimately unknown.

Finally, the overall structure of the online version of the task did not allow for limiting of response length or other aspects of administration. Given that depending upon how the participant interpreted the instructions they chose to respond with full sentences in some cases

and in single words or ideas in other cases. Due to the nature of the task using a simple frequency count to measure cognitions and the time limit of 60 seconds per condition, longer responses would result in fewer responses within the 60 second period. However, this reduction in responses would not be the result of fewer cognitions, it would be the result of each cognition taking longer to produce, thus truncating some of the participants' maximum possible responses without any method of appropriately correcting for this when interpreting the data.

In sum the memory and future thinking task has the potential to be a meaningful representation of an individual's tendency to orient their thoughts toward positive or negative and future or past, but a great deal of control and screening is necessary to ensure the measurements are valid. Online administration does not appear to be a good method of data collection as it severely limits the control the experimenter has on the conditions under which a participant responds to each condition of the task. Additionally, some form of more formal assessment that measures verbal skills is necessary as the simple word writing task did not appear to provide meaningful information related to this particular issue, and it also suffered greatly from the lack of control as a result of the remote online administration.

Sample Limitations

Size. The original target sample size for this study was 300 recruited adolescent participants, allowing for a minimum bound of 200 after accounting for attrition. However, the total number of participants who completed the entirety of the study activity was only 159, falling short of the minimum goal. The overall sample of 159 participants did satisfy the general guidelines for achieving enough sensitivity to detect medium effect sizes (Cohen, 1988), however given what is known about the data the ability to detect small effect sizes may be important given the weakness of some of the regression results. Unfortunately, as the desired

effect size gets smaller the necessary n required increased drastically, and considering a sample size of 159, an error probability of .05, a power threshold of .8, and 2 predictor variables the maximum detectable effect size is approximately .05, shy of the small effect size bounds (Cohen, 1988). Therefore, the assumption that constructs in the analysis such as positive future cognition that appear to fall below the threshold of significance at the present level of detection may have more to reveal given a larger sample size. Additionally, when the power analysis was being conducted the power to detect main effects was the only aspect that was inspected for adequacy. However, the power to detect interactions should also have been assessed, thus leaving the researcher poorly equipped to assess the meaning of all of the non-significant interaction terms in the analysis.

Demographics. Ideally the researcher intended to recruit a representative sample of adolescents from a variety of living environments, cultural backgrounds, and genders. Unfortunately, the sampling procedures ultimately resulted in the vast majority of participants being white college age women attending the same university. While there were some men and individuals who identified as non-white that participated, only 33 participants identified as men and 41 as non-white, resulting in 79% of the sample identifying as female and 74% as white. Likewise, age was also a skewed demographic with only 18 individuals (11%) identifying as 17 years old or younger, and 23 individuals (14%) identifying as 20 or older which was outside the bounds of the original age range of the study. The latter being another unfortunate weakness of the unsupervised online administration methods.

Recruitment procedure. This study employed two forms of recruitment that corresponded to the setting in which recruitment was to take place. In the high school setting the recruitment took place as both an announcement made by homeroom teachers and paper fliers

provided to any interested student, and in the university setting recruitment took place via repeated email message contained within a daily email digest directed at undergraduate students. The major flaw with both forms of recruitment was that there was not any member of the research team present to answer questions at the time the information was provided to potential participants which may have influenced their choice in pursuing participation further.

Additionally, certain aspects of the two recruitment sites were not appropriately considered at the time of recruitment. A major difference between the high school and university setting was that the university students were repeatedly exposed to recruitment materials and had considerably more flexibility as to when they had to complete the study materials, where the high school students were exposed only once formally and few if any times after that and only had set times during the day to complete the study materials which may have been restrictive depending upon their willingness or ability to find free time during the school day.

Finally, a major difference in access to study participation was the requirement for parental consent from those individuals under 18 years of age. It added an additional step to approval for participation and the only information provided to parents was the information sheet and permission forms sent home with students with no confirmation that if a student took a form home that it was shown to their parents. This limitation may account for the disproportionate number of university students who participated versus high school students who participated.

Concerns Regarding DASS 21 as Primary Dependent Variable

The Depression, Anxiety, and Stress Scale (Lovibond & Lovibond, 1995b) was originally designed for an adult population, however literature cited by the DASS-21 website and the authors supports its use with adolescents as young as 14 years of age (Tully, Zajac, & Venning, 2009; Szabo, 2010; Willemsen, Markey, Declercq, & Vanheule, 2010). However, some studies

did not find the same results when examining both the factor structure of the DASS-21 and when comparing models of adult depression and adolescent depression (Patrick, Dyck, & Bramston, 2010). Therefore, while the use of the DASS-21 with this study's sample is still believed to be a valid assessment, it is important to consider that there have been findings that indicate limitations in the DASS-21's applicability with adolescents. Dr. Marianna Szabo and colleagues have been working on developing a 27 item adolescent specific form of the DASS, however at the time the present study procedure was carried out this version was not available, but should be considered in the future.

Suggestions for Future Research

Going forward there are many suggestions that might make future investigations into adolescent cognition and mental health run more smoothly or yield more robust results, however there is also some promising information that may help guide future research and inform assessment development. At the present time to the best of the experimenter's knowledge there have been few studies into the temporal orientation of adolescent thought and its relationship with depression, anxiety, and stress symptoms. Primarily this section will detail what steps might be taken in future studies to either improve upon the present investigation if the intention is replication or suggestions for alterations to the methods to improve the study as a whole.

Improvements and alternate methods

The present study had many limitations as outlined above in the limitations section of chapter 5. However, several of these limitations can be addressed by modifying study methods and thus may aid future research in exploring adolescent cognition and mental health. These improvements include sample size, recruitment, and diversity, as well as improvement upon control of administration and measurement of the dependent and independent variables

respectively and modification of the dependent variables to better assess the constructs of interest.

Sample size, recruitment, and diversity. The size of the present study's sample was 159 students between the ages of 14 and 18 years old, however this number failed to reach the sample size goal of 200. Previous studies sampled between 100 and 150 (Miles, MacLeod, & Pote, 2004), so this study did increase the overall sample slightly from a previous iteration, however to truly detect what may be a much smaller sample size than previously believed a larger sample of 250 or more is recommended.

The present study sampled these participants from both the high school and the university setting, however the majority of the participants ultimately came from the university setting. This may have occurred for several reasons discussed previously in the limitations section, but going forward there are changes that may allow for a better balance between the two settings and make recruitment more effective.

First in future replications of this study it will be important to use repeated recruitment attempts using a standard recruitment material across all recruitment settings. Additionally, the recruitment process may be more effective in both settings if the initial recruitment solicitation is simply to indicate interest and then a second brief information session is offered to explain the full details of participation and to distribute documents and for those interested in participating acquire signed informed consent documents. Much of the success of the university level recruitment came from its automation and allowed the participants to complete the study survey at whatever time and in whatever environment they choose with, in retrospect, no supervision and little control. While this did bring in a high number of participants it came with other

procedural costs, thus taking more time to follow through with a structured and controlled two stage recruitment process may be worth the added resource cost.

Finally, the diversity of the sample was minimal, the vast majority of participants were white college age women from Connecticut. In addition, the two high school recruitment sites that participated were both medium to large suburban schools in Connecticut and of those students who responded from these schools most were white girls and women. So overall the few high school students that did participate were also white women. Since the majority were college age this placed most of the participants in the 18 to 19 years of age category. In future studies special care should be taken to diversify the school contexts that are solicited for recruitment (urban, suburban, rural, etc.) and recruitment should continue until a representative sample of participants properly resembles the culture, gender, and age distribution of adolescents in the United States or other country where the research is being carried out which the present study was unable to do given time constraints and limited resources.

Additionally, future studies may want to intentionally limit the demographic characteristics of the target sample and carry out several smaller studies as part of a larger investigation to be better able to assess consistent differences between groups. Given some of the topics discussed in the following section, the nature of the study requires a large sample to detect the hypothesized effects, therefore it may be more reasonable to focus recruitment and sampling efforts.

Control and modification of assessment administration. Given many of the limitations faced in the present study there are several suggestions that should be made in future regarding the Memory and Future Thinking Task (MFTT). In the present study this task was administered in two separate forms, an online version and a paper and pencil version. This was admittedly a

mistake in that the online version, while considerably easier to administer and convenient for the participant, had very little control and there was no procedural feedback as no member of the research team was present to observe the success or failure of the assessment procedures.

In the future if an investigator chooses to use the MFTT as a measure of an independent variable, completion of this task should take place in small groups, and supervised by an experimenter or member of the research team as to address problems and abnormalities in administration in real time. The format of the MFTT should likely remain either in a paper and pencil listing task or in the form of an interview as these are the only two formats that have documented evidence of effective administration in the literature presented by MacLeod and colleagues and cited by Vilhauer et al. (2011).

Additionally, aside from the modification of the administration the MFTT was often paired with a word writing task as a control to determine if participant verbal skills were adequate to successfully complete the task. In the present study the FAS word writing task (Lezak, 1976) did not provide the information necessary to determine if a writing or verbal language component had a significant influence on participant performance as hypothesized after reviewing the regression data. In future studies which employ the MFTT a different verbal and written language control task is recommended.

Noting that verbal and written language ability is important to assess, the reason for this is that as discussed in the limitations it also appeared that writing skill and length of responses likely contributed to overall MFTT scores skewing the results, as a simple frequency measurement is not sensitive to this kind of variation in the listing task, especially given the timed element. Therefore, in the future the MFTT as currently designed, considering both the timed element and the open response aspect may beh oove future researchers to adjust how

responses are produced (e.g. single word responses) or expand the task instructions to direct participants to use the most concise wording possible to express their memories and expectations, though that still leaves much room for error.

In sum considering all of the aforementioned limitations and suggestions going forward, before any further research is conducted using the MFTT as a primary assessment task the MFTT itself should undergo a significant investigation and tuning to determine the ideal setting and assessment method and to further gather baseline data to use as a comparison for future administrations (e.g. a normative sample to determine typical response rates for different populations). The MFTT at the present time is not recommended for future studies in its present form, however in concept it remains an interesting measurement and is worthy of further development.

Potential Significance of the Findings

Although the findings of this study do not provide clear answers to the research questions, they do however provide insight into the value of utilizing cognitive orientation to predict mental health concerns and the probable efficacy of the measurement methods in the present study. Hope as a construct appears to incorporate much of the proposed construct of positive future expectation. While the tool used to measure PFC appears to be flawed in many ways, the notion that the valence of a person's beliefs about the future may directly affect their emotional state is still quite likely, as the correlation between Hope and depression suggests.

However, an important consideration that the present study brings to light is that the scale used to measure Hope intends to measure a disposition or the trait of hopefulness, where the depression measure (one portion of the DASS 21) measures the state of depression at a given moment. Perhaps it would be meaningful to examine this relationship over time, if a measure

like the MFTT is to be as useful as a short screening tool then ultimately its long term predictive efficacy of depressive symptoms is critical. Likewise, the same might be true of anxiety and susceptibility to stress. Thus the present results should inform future research on at the very least how to avoid the technical and methodological pitfalls that the present study encountered.

Hopefully future research will continue to examine methods of measuring the temporal orientation of adolescent thought and its relationship to mental health outcomes over time. The results of the present study, while inconclusive, may contribute in some meaningful way to that research. As studies continue to touch on the subject matter it may be that all data collected, be it of measures that are successful or unsuccessful in their prediction of depression, will be important in the design of that which will ultimately result in the most efficacious screening tool.

Summary

This dissertation examined prospective and retrospective cognition and its relationship and ability to predict depression, anxiety, and stress symptoms. After controlling for the already established predictive power of hope as defined by Snyder (2002) positive future cognition was not a significant predictor of depression symptoms. However, negative past cognition and negative future cognition do appear to contribute some predictive power over and above hope when predicting stress and anxiety symptoms respectively. While these are interesting findings the effects that were significant were small, however there are many limitations that induce a degree of caution when interpreting the results, mostly as a result of the lack of control in the administration of the primary independent variable task.

The importance of the findings in this study are twofold. First there ultimately was a relationship between a participant's ability to produce memories and expectations that are negative and the prediction of stress and anxiety, a finding worthy of investigation in the future.

Second, many of the limitations and implementation pitfalls of the Memory and Future Thinking Task (MFTT) indicate that this task requires a great deal of refinement before it is to be used again in the future, or an alternate form should be considered which utilizes simplified responses or more detailed instructions. If no other measure attempts to assess the same constructs as the MFTT then these findings are a justification for further validation of the MFTT as a meaningful measure of cognitive tendency or investigation into an alternative method of measuring this construct. Additionally, going forward building a more diverse participant pool to sample from or carrying out demographically targeted studies on this topic is necessary as the present study sample consisted of a majority of white college age women which is not representative of the overall adolescent population that suffers from various mental health conditions in the United States. In sum a focused approach looking at both demographics and constructs more carefully is a major recommendation going forward.

REFERENCES

American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5th ed.). Arlington, VA: American Psychiatric Publishing.

Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the depression anxiety stress scales in clinical groups and a community sample. *Psychological Assessment*, 10, 176-181.

Aspinwall, L. G., & Taylor, S. E. (1997). A stitch in time: Self-regulation and proactive coping. *Psychological Bulletin*, 121, 417–436.

Beck, C.T., Epstein, N., Brown, G., & Steer, R.A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consultiing and Clinical Psychology*, 56, 893-897.

Beck, A.T. & Steer, R.A. (1987). *Manual for the revised Beck Depression Inventory*. San Antonio, Texas: The Psychological Corporation.

Beck, A.T. & Steer, R.A. (1990). Manual for the Beck Anxiety Inventory. San Antonio, Texas: The Psychological Corporation.

Bjarehed, J., Sarkohi, A., & Andersson, G. (2010). Less positive or more negative? Future-directed thinking in mild to moderate depression. *Cognitive Behaviour Therapy*, 39, 37-45.

Can the DASS be used with children / adolescents? (n.d.) Item 10 in frequently asked questions section of the Depression, Anxiety, and Stress Scale website. Retrieved from http://www2.psy.unsw.edu.au/groups/dass//DASSFAQ.htm

Chatterjee, S., & Simonoff, J.S. (2013). *Handbook of Regression Analysis*. Hoboken, NJ: John Wiley & Sons, Inc.

Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20, 37-46.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* Hillsdale, NJ: L. Erlbaum Associates.

Cohen, J. (1992). Quantitative methods in psychology: A power primer. *Psychological Bulletin*, 112, 155-159.

Cohen, J., & Cohen, J. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*. Mahwah, N.J: L. Erlbaum Associates.

Costello, C.G. & Comrey, A.L. (1967). Scales for measuring anxiety and depression. *Journal of Psychology*, 66, 303-313.

Crowe, M., Ward, N., Dunnachie, B., & Roberts, M. (2006). Characteristics of adolescent depression. *International Journal of Mental Health Nursing*, 15, 10-18. DOI: 10.1111/j.1447-0349.2006.00399.x

Ellis A. (1957). Rational psychotherapy and individual psychology. *Journal of Individual Psychology*, 13, 38–44

Fowler, S. & Szabo, M. (2012). The emotional experience associated with worrying in adolescents. *Journal of Psychopathology and Behavior Assessment*, DOI: 10.1007/s10862-012-9316-3

Gott, C. & Lah, S. (2014). Episodic future thinking in children compared to adolescents. *Child Neuropsychology*, 20, 625-640. DOI:10.1080/09297049.2013.840362

Harman, H.H. (1976). *Modern factor analysis*. Chicago: Chicago University Press.

Kovacs, M., & Paulauskas, S. L. (1984). Developmental stage and the expression of depressive

disorders in children: An empirical analysis. In D. Cicchetti, & K. Schneider-Rosen (Eds.), Childhood depression. San Francisco: Jossey-Bass.

Kuhn, D. (2009). Adolescent Thinking. In Lerner, R. M. & Steinberg, L. (Eds.), Handbook of adolescent psychology. Hoboken, NJ: John Wiley & Sons, Inc.

Lezak, M. D. (1976). *Neuropsychological assessment*. New York: Oxford UniversityPress.

Lovibond, S. H., & Lovibond, P. F. (1995). Manual for the depression anxiety stress scales (2nd ed.). Sydney, Australia: Psychology Foundation.

Macleod, A. K. & Byrne, A. (1996). Anxiety, Depression, and the anticipation of future positive and negative experiences. *Journal of Abnormal Psychology*, 105, 286-289.

Macleod, A. K., Byrne, A., & Valentine, J. D. (1996). Affect, emotional disorder, and future-directed thinking. *Cognition and Emotion*, 10, 69-86.

Macleod, A. K. & Conway, C. (2007). Well-being and positive future thinking for the self versus others. *Cognition and Emotio*, 21, 1114-1124.

Macleod, A. K. & Salaminiou, E. (2001). Reduced positive future thinking in depression: Cognitive and affective factors. *Cognition and Emotion,* 15, 99-107.

MacLeod, A. K., Tata, P., Kentish, J., & Jacobsen, H. (1997). Retrospective and prospective cognitions in anxiety and depression. *Cognition and Emotion*, 11, 467-479.

Martin, L. A., Neighbors, H. W., & Griffith, D. M. (2013). The experience of symptoms of depression in men vs women: Analysis of the national comorbidity survey replication. *Journal of American Medical Association Psychiatry*, 70, 1100-1106.

Miles, H., MacLeod, A. K., & Pote, H. (2004). Retrospective and prospective cognitions in adolescents: Anxiety, depression, and positive and negative affect. *Journal of Adolescence*, 27, 691-701.

National Institute of Mental Health. (2011). *Depression* (NIH Publication No. 11-3561). Bethesda, MD: U.S. Government Printing Office.

Patrick, J., Dyck, M., & Bramston, P. (2010). Depression anxiety stress scale: Is it valid for children and adolescents? *Journal of clinical Psychology*, 66, 996-1007.

Schacter, D.L., Addis, D.R., & Buckner, R.L. (2007). Remembering the past to imagine the future: The prospective brain. *Nature: Neuroscience*, 8, 657-661.

Snyder, C. R. (2002). Hope Theory : Rainbows in the Mind. *Psychological Inquiry, 13*(4), 249-275.

Snyder, C. R., Hoza, B., Pelham, W. E., Rapoff, M., Ware, L., Danovsky, M.,Highberger, L., Rubinstein, H., & Stahl, K. J. (1997). The development and validation of the children's hope scale. *Journal of Pediatric Psychology*, 22, 399-421.

Sohl, S. J. & Moyer, A. (2009). Refining the conceptualization of a future-oriented self-regulatory behavior: Proactive coping. *Personality and Individual Differences*, 47, 139-144.

Stöber, J. (2000). Prospective cognitions in anxiety and depression: Replication and methodological extension. *Cognition and Emotion*, 14, 725-729.

Schwarzer, R., & Taubert, S. (2002). Tenacious goal pursuits and striving toward personal growth: Proactive coping. In E. Fydenberg (Ed.), Beyond coping: Meeting goals, visions and challenges (19–35). London: Oxford University Press.

Szabo, M. (2010). The short version of the depression anxiety and stress scale (DASS-21): Factor structure in a young adolescent sample. *Journal of Adolescence*, 33, 1-8.

Tully, P. J., Zajac, I. T., & Venning, A. J. (2009). The structure of anxiety and depression in a normative sample of younger and older Australian adolescents. *Journal of Abnormal*

Child Psychology, 37, 717-726.

Valle, M. F., Heubner, E. S., & Suldo, S. M. (2004). Further evaluation of the children's hope scale. *Journal of Psychoeducational Assessment*, 22, 320-337.

Vilhauer, J. S., Young, S., Kealoha, C., Borrmann, J., IsHak, W. W., Rapaport, M. H., Hartoonian, N., & Mirocha, J. (2011). Treating major depression by creating positive expectations for the future: A pilot study for the effectiveness of future-directed therapy (FDT) on Ssymptom severity and quality of life. *CNS Neuroscience & Therapeutics*, 00, 1-8.

Weissman, M.M., Wolk, S., Goldstein, R.B., Moreau, D., Adams, P., Greenwald, S., Klier, C.M., Ryan, N.D., Dahl, R.E., & Wickramaratne, P. (1999). Depressed adolescents grown up. *Journal of the American Medical Association*, 281, 1707-1713.

Willemsen, J., Markey, S., Declercq, F., & Vanheule, S. (2010). Negative emotionality in a large community sample of adolescents: The factor structure and measurement invariance of the short version of the depression anxiety stress scales (DASS-21). *Stress and Health*, 27, 120-128.

APPENDICES

Appendix A: Memory and Future Thinking Task

You will have 1 minute to list as much as you can for each time period listed below. The member of the research team conducting this study will let you know when to start and stop for each time period. Each page will ask you to write either positive or negative memories, positive or negative expectations, or simple words beginning with certain letters. Please read the bold text below carefully on each page, as it will change depending on the task. Not everyone will be working on the same section at the same time, so please focus on your specific task and ignore others.

Positive Personal Future Task

Please list as many positive things as you can think of that you believe you will experience in the following future time periods.

1-WEEK:

_____

_____

_____

_____

_____

1-YEAR:

_____

_____

_____

_____

_____

5-10 YEARS:

_____

_____

_____

_____

You will have 1 minute to list as much as you can for each time period listed below. The member of the research team conducting this study will let you know when to start and stop for each time period. Each page will ask you to write either positive or negative memories, positive or negative expectations, or simple words beginning with certain letters. Please read the bold text below carefully on each page, as it will change depending on the task. Not everyone will be working on the same section at the same time, so please focus on your specific task and ignore others.

Negative Personal Future Task

Please list as many negative things as you can think of that you believe you will experience in the following future time periods.

1-WEEK:

_____

_____

_____

_____

_____

1-YEAR:

_____

_____

_____

_____

_____

5-10 YEARS:

_____

_____

_____

_____

You will have 1 minute to list as much as you can for each time period listed below. The member of the research team conducting this study will let you know when to start and stop for each time period. Each page will ask you to write either positive or negative memories, positive or negative expectations, or simple words beginning with certain letters. Please read the bold text below carefully on each page, as it will change depending on the task. Not everyone will be working on the same section at the same time, so please focus on your specific task and ignore others.

Positive Personal Memory Task

Please list as many positive things as you can think of that you have experienced in the following time periods in the past.

1-WEEK:

_____

_____

_____

_____

_____

1-YEAR:

_____

_____

_____

_____

_____

5-10 YEARS:

_____

_____

_____

_____

You will have 1 minute to list as much as you can for each time period listed below. The member of the research team conducting this study will let you know when to start and stop for each time period. Each page will ask you to write either positive or negative memories, positive or negative expectations, or simple words beginning with certain letters. Please read the bold text below carefully on each page, as it will change depending on the task. Not everyone will be working on the same section at the same time, so please focus on your specific task and ignore others.

Negative Personal Memory Task

Please list as many negative things as you can think of that you have experienced in the following time periods in the past.

1-WEEK:

_____

_____

_____

_____

_____

1-YEAR:

_____

_____

_____

_____

_____

5-10 YEARS:

_____

_____

_____

_____

You will have 1 minute to list as much as you can for each time period listed below. The member of the research team conducting this study will let you know when to start and stop for each time period. Each page will ask you to write either positive or negative memories, positive or negative expectations, or simple words beginning with certain letters. Please read the bold text below carefully on each page, as it will change depending on the task. Not everyone will be working on the same section at the same time, so please focus on your specific task and ignore others.

Word Writing Task

Please list as many words which start with the following letters as you can within the 1 minute period allowed. The research team member might refer to it as "time period", but simply proceed as this text instructs.

Letter "F":

_____

_____

_____

_____

_____

Letter "A":

_____

_____

_____

_____

_____

Letter "S":

_____

_____

_____

_____

Appendix B: Depression Anxiety Stress Scale 21

DASS21 *Name:* *Date:*

Please read each statement and circle a number 0, 1, 2 or 3 that indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 Did not apply to me at all
1 Applied to me to some degree, or some of the time
2 Applied to me to a considerable degree, or a good part of time
3 Applied to me very much, or most of the time

1	I found it hard to wind down	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (eg, in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3
19	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3

Appendix C: Children's Hope Scale

The Children's Hope Scale

Directions: The six sentences below describe how people think about themselves and how they do things in general. Read each sentence carefully. For each sentence, please think about how you are in most situations. Place a check inside the circle that describes YOU the best. For example, place a check (,/) in the circle (O) above "None of the time, "if this describes you. Or, if you are this way "All the time," check this circle. Please answer every question by putting a check in one of the circles. There are no right or wrong answers.

1. **I think I am doing pretty well.**

O	**O**	**O**	**O**	**O**	**O**
None of the time	A little of the time	Some of the time	A lot of the time	Most of the time	All of the time

2. **I can think of many ways to get the things in life that are most important to me.**

O	**O**	**O**	**O**	**O**	**O**
None of the time	A little of the time	Some of the time	A lot of the time	Most of the time	All of the time

3. **I am doing just as well as other kids my age.**

O	**O**	**O**	**O**	**O**	**O**
None of the time	A little of the time	Some of the time	A lot of the time	Most of the time	All of the time

4. **When 1 have a problem, I can come up with lots of ways to solve it.**

O	**O**	**O**	**O**	**O**	**O**
None of the time	A little of the time	Some of the time	A lot of the time	Most of the time	All of the time

5. **I think the things I have done in the past will help me in the future.**

O	**O**	**O**	**O**	**O**	**O**
None of the time	A little of the time	Some of the time	A lot of the time	Most of the time	All of the time

6. **Even when others want to quit, I know that I can find ways to solve the problem.**

O	**O**	**O**	**O**	**O**	**O**
None of the time	A little of the time	Some of the time	A lot of the time	Most of the time	All of the time

Notes: When administered to children, this scale is not labeled "The Children's Hope Scale," but is called "Questions About Your Goals." The total Children's Hope Scale score is achieved by adding the responses to the six items, with "None of the time"= 1; "A little of the time"= 2; "Some of the time"= 3; "A lot of the time"= 4; "Most of the time"= 5; and, "All of the time"= 6. The three odd-numbered tap agency and the three even-numbered items tap pathways.

Appendix D: Demographic Questionnaire

Demographic Questionnaire

These questions are completely optional; you may answer any number of them or none of them. If you wish to skip this section completely please click the "next" button at the bottom of the screen.

1. Please provide your age: _____

2. Please indicate your sex.

   Male Female

3. Please indicate the ethnicity with which you identify, if none put other.

   _____

4. Please tell us which grade you are in: _____

Coding Criteria for The Role of Prospective and Retrospective Cognition in Adolescent Mental Health

The Coding Key is 1=Acceptable Response 0=Duplicate/Rejected Response

Relevant Context Information

1. **All participants were ages 14-19 years old**

2. **All participants were either High school students grades 9-12 or University freshman and sophomores, this information should be considered when interpreting and determining context for the purposes of potential exclusion of Reponses at the discretion of the coder.**

3. **All response to the survey took place either in October-December of 2013 or April to May of 2014, these dates should be considered when determining context for the purposes of potential exclusion of responses as noted below and at the discretion of the coder.**

Coding Criteria for the Memory and Future Thinking Task

1. For Each participant randomly selected for the inter-observer agreement check, the Inter-rater Reliability Record Form should be completed.
   a. This form contains a section for each condition (Positive Future (PF), Negative Future (NF), Positive Past (PP), Negative Past (NP) and the timeframes within each (1w, 1y, and 5-10y), in that order).
   b. Within each time frame the individual coding should copy each response provided by the participant into one of the cells provided under the "Participant Response ↓" Heading.
   c. Beside those responses in the "Code (Y or N)" column the individual coding should record a 1 to indicate that they accept the response as a unique response to the prompt, or a 0 to indicate that they reject this response for any of the reasons provided below…

2. As a result of consultation with one of the co-developers of the Memory and Future Thinking Task Dr. Andrew Macleod, the following are basic coding criteria.

   a. To exclude a response it must be vividly clear that two responses are referring to the exact same event, and if that can be determined one of those responses should be coded 0 and the other 1.

i. Dr. Macleod stated that, “If there is room for doubt and you are having to make an inference that it [a potential repeat response] is the same event [as another response provided] then you do not exclude it [i.e. Mark both as 1]. “

    1. For example, if a person for the “one week” “negative future” prompt responded with "death of my grandmother", and then for the “5-10 year” “negative future” timeframe responded with "death of family members", one might believe that those two responses may be referring to the same possible event, but given that the coder must make that inference that “death of family members” may or may not include individuals other than the participants grandmother, both would be marked as 1.

ii. Additionally, if “A” (any given response) is a subset of “B” (another broader response that may encompass “A”), then “A” and “B” should be counted independently as “A” was unique enough in the mind of the participant to be listed specifically in addition to the broader category of “B”. Even though “A” belongs to “B” they don't necessarily overlap entirely in the mind of the participant, we would need to infer that he or she intended “A” and “B” to mean the same thing, and thus we must accept and code both separately as 1.

    1. For example, if a participant responded with “music” and “Christmas Music” within the same prompt, initially “music” would seem to supersede “Christmas music” if listening to music generally was what the participant was trying to express. However since “Christmas Music” might also be related to the participant’s excitement about the coming Christmas season or that “music” might simply be their love of playing music, writing music, or listening to the radio on the ride to work each day, we can’t without inference know that they are one in the same and thus must accept and code them both as 1.

iii. The only exception to the aforementioned criteria that was noted by Dr. Macleod was that all “verbatim repeat” responses across timeframes (week, year, 5-10 years) are discounted as that requires you to infer that they are different. This is the only grey area case where forced inference will lead to the discounting of a response.

    1. A “verbatim repeat” may also include one additional word and still be considered a “verbatim repeat” so long as it does not alter the meaning or context of the response, which ultimately will be at the discretion of the individual coding the response.

        a. For example good grades (within the 1-week prompt) and get good grades (within the 1-year prompt), it is clear that these two responses are nearly identical, and even though they may be

referring to a variety of "good grades" across both time periods, the difference is not significant enough to warrant two accepted responses, thus one should be marked 1 and the other 0.

i. The rationale provided by Dr. Macleod for excluding "verbatim repeat" responses is to help control for occasions where participants will put the same response for all prompts due to the lack of ability/willingness to think of additional novel responses in addition to the expectation that participants will generally assume that more responses are better than less, even though nowhere is that value judgment expressed to them in the directions. Although it is assumed some genuine responses may be excluded under this practice of scrutiny, there have been other assumptions made in the remainder of the coding criteria where it should not dramatically alter the final sum responses for each individual participant. However, it should help to control for artificial inflation due to the two concerns noted above, perceiving more responses are "better" and the repeat of responses to avoid the need to think further into the response/prompt.

3. Other Criteria Considered by the student investigator to be worthy of consideration.

   a. In instances where there was no clear respondent intentionality provided, for example a single word or phrase that doesn't immediately make sense in an event context to the coder (excluding those that appear to be an erroneous keystrokes or unintelligible series of characters) but still may represent a potential event and it is intelligible, it must be assumed to have some relevant significance to the participant as an incomplete potential response, and thus should be counted as a valid event and marked as 1, unless it is a "verbatim repeat". The rationale being that the participant clearly had an additional event in mind when beginning the response but may have been cut off by the time limit not a lack of potential responses. This may also help to offset the rejection of genuine responses due to "verbatim repeats" in some cases.

   b. If the potential span of time, based on the timeframe in which each response is noted or the context provided by the participant, would make it highly unlikely or impossible that two events in question were actually the same event, each should be counted and marked 1.
      i. For example if in the "1-week" "negative past" prompt a participant notes "Homesickness" and in the "1-year" "negative past" prompt they note "summer homesickness", based on the fact that the survey was conducted in October-Dec

2013 and April-May 2014, the “1-week” past response and any response which implies a context of summer time could not possibly overlap and thus should be considered separate and each coded as 1.

4. Criteria pertaining only to the F-A-S verbal fluency task at the bottom of each coding sheet and participant response document.

    a. Repeats of the same words with different suffixes is not allowed, for example Jerk and jerked would not both be counted, but fly and flown would since there is a clear change in the character composition of the word.